M. A.

THESIS

EDGAR ALLAN POE : THE NON - SCIENTIFIC SCIENTIST

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EDGAR ALLAN POE : THE NON - SCIENTIFIC SCIENTIST

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ABSTRACT

A study of the period 1830-1850, leads us to conclude that Poe's scientific stories were deeply influenced by the scientific developments of his time. This period was, in the United States, an era of invention and innovation in all branches of science. Poe's fascination with science can be traced throughout his life, although he sometimes showed himself an opponent of industrialism and of certain scientific procedures.

Poe wrote many tales in which he deals with exact or practical applied sciences; tales related to physics, chemistry, geography, astronomy, zoology, botany and scientific inventions. He also treated pseudo-scientific subjects such as alchemy and phrenology. Nevertheless, Poe apparently did not go deep in his studies of these subjects. Exact and pseudo-sciences served mainly as a source of inspiration for him. He often extracted strange ideas from scientific phenomena to make up fantastic tales.

Poe's ratiocination stories indicate the bent of his mind that was logical, analytic and scientific. At the same time they delineate the other side of his intelligence which was poetical and intuitive. Like his detective Dupin, Poe was half scientist, half poet. His stories do not present a truly scientific character because Poe let the poetic and imaginative level of his mind work on his fiction. Here lies the reason why one may call him a "non-scientific scientist". He does seem to have had a certain scientific understanding, but his sometimes erring-science is indicative that his knowledge was not profound.

Poe's greatest preoccupation, however, was with more philosophical and speculative matters. Mesmerism and magnetism helped him solve his spiritual anxieties. In his stories these subjects allowed him to transcend earthly ties and reach immortality. Poe's inquiries in exact and pseudo-sciences may be said to have been motivated by his quest for absolute knowledge. By going beyond exact facts he wanted to understand the mystery of the universe. With science he expected to reach something more important. He sought to go so far as to understand the first principles and primal beings of the universe-the mystery of existence. For Poe, science was also a way to penetrate the ultimate secret of God.

RESUMO

Um estudo do período 1830-1850, leva-nos à concluir que as estórias científicas de Poe foram profundamente influenciadas pelos desenvolvimentos científicos de sua época. Esse período foi, nos Estados Unidos, tempo de invenções e inovações em todos os ramos da ciência. A fascinação de Poe por ciência é uma constante em toda sua vida, embora ele algumas vezes se mostrasse contrário ao industrialismo e a certos métodos científicos.

Poe escreveu muitos contos nos quais as ciências exatas e práticas são focalizadas; contos relacionados com física, química, geografia, astronomia, zoologia, botânica, invenções científicas e assuntos pseudo-científicos como alquimia e frenologia. Entretanto, Poe aparentemente não se aprofundou nos seus estudos referentes à esses tópicos e usava as ciências exatas e pseudo-ciências como fonte de inspiração, d'onde muitas vezes extraia suas estranhas idéias de fenômenos científicos e construia seus contos fantásticos.

As estórias de "raciocínio" de Poe indicam seu lado lógico, analítico e científico; outrossim, insinuam sua outra face poética e intuitiva. Como Dupin, o detetive de suas aventuras, Poe era meio-cientista e meio-poeta, cunhando suas estórias de um caráter não verdadeiramente científico pois, permitia que o poder criativo e poético de sua mente trabalhasse em suas ficções. Estas são as razões que nos levam à considerá-lo "um cientista não científico". Êle certamente deve ter sido iniciado no estudo de ciências, mas diante de idéias algumas vêzes errôneas, indica que êste conhecimento não era profundo.

Porém, a maior preocupação de Poe, se concentrava nos assuntos filosóficos e especulativos. Mesmerismo e magnetismo auxiliaram-no na solução de suas ansiedades espirituais. Em suas estórias, esses assuntos permitiram-no transcender os laços terrenos e alcançar a imortalidade. Suas indagações com ciências exatas e pseudo-ciências parecem ter sido motivadas por sua busca do conhecimento absoluto; na tentativa de ir além dos fatos exatos êle queria a compreensão do mistério do universo. Através da ciência êle ansiava o entendimento do princípio das coisas e sêres, desvendando o mistério da existência. Para Poe a ciência era um caminho para penetrar no supremo mistério de Deus.

TABLE OF CONTENTS

1. Introductory.

1.1. Statement of Purpose.

After reading some of the major biographies and critical works on Edgar Allan Poe, one comes to realize that most studies of Poe's writing have been based on a psychological approach. Very little criticism has been carried out specifically on Poe's scientific concerns. General comments have been casually noted by critics on the quality of Poe's scientific knowledge, but I feel that this subject has not received the attention it deserves.

This paper is not intended as a psychoanalytical study of the author. The Poe with whom I am concerned is the Poe of the scientific stories. I will restrict myself to a study of the content of those stories which deal with scientific themes,and will superimpose those ideas on the history of nineteenth-century American science. Only incidentally will this study allude to Poe as a poet. I do not have therefore, any claim to thoroughness, and I have not sought to investigate the bases or accuracy of all Poe's scientific statements. I do not feel myself equipped to do an exhaustive analysis of Poe's science. The impossibility of having access to specialized scientific works makes it particularly difficult to do any kind of thorough research in this area. Under these circumstances I have limited myself to an analysis of the uses Poe made of science and the significance it had for him. I have concluded that in Poe, exact and pseudo-sciences did not have a deep scientific meaning in themselves. They may be said to have constituted a means to metaphysics and transcendentalism. These subjects allowed him to go beyond exact facts. Thus one of the major problems to be confronted in this paper is not just that Poe uses science but that he uses it in an ambivalent manner to go beyond it. On the one hand,he is drawn to the rationalism of science and makes a pretense of exactitude in his scientific stories. On the other hand,he shows his scorn for progress and attacks science, the machine era,and industrialism. In a word, Poe is critical of science and at the same time its disciple.

In the first chapter of this dissertation I review briefly

some of the previous criticism made of Poe. Then I undertake an examination of the scientific concepts which were current in America in the first half of the nineteenth century. Thus we will be in the position to see how Poe was influenced by the cultural background of the period in which he lived. In chapter 3. I shall consider Poe's environment(familial, social, religious, economic and political), and point out how his interest in science developed gradually throughout his life. Chapter 4. discusses the Baconian methodology of the time and Poe's criticism of it. The chapter also deals with the well-defined field of Poe's analytic mind. In this section I treat Poe's detective and ratiocination stories, those works in which Poe attempted to exercise the rational, puzzle-solving bent of his mind, that level of his intelligence that was, in its way, scientific, logical and systematic . In chapter 5. the stories related to exact and practical applied sciences will receive our attention. We shall demonstrate that Poe's analytical mind accounts for his interest in exact sciences (physics, chemistry, botany, zoology, astronomy), also in practical applied science (inventions), and in pseudo-sciences (alchemy and phrenology). Baconian induction and analysis seem to be pervading characteristics of the scientific mind of Edgar Poe. However, throughout this chapter we shall note that Poe also lets his imagination work on his fiction. He is never completely rational. Even in his scientific tales Poe the poet is never at rest. Fiction is often intermingled with phantasy. We shall argue in this section that exact science is merely a source of inspiration for Poe. He is not scientific in the ordinary sense. He often uses exact sciences to describe emotional effects.

Although Poe uses the inductive method in his ratiocination stories he deviates from the Baconian framework in that he allows his imagination to go beyond the limits established by that scientific methodology. Finally in chapter 6. I intend to show that Poe's imagination is responsible for his inquiries into philosophical and speculative sciences. Toward the end of his life Poe became more and more concerned with abstract matters such as metaphysics and transcendentalism. In this area of scientific inquiry Poe was most sincere. We shall try to show that his speculations

on mesmerism and magnetism constituted a means to help Poe in the solution of his spiritual inquiries. Particular emphasis will be devoted to dealing with this central dilemma in Poe. Poe's use of exact and speculative sciences is related to his quest for absolute knowledge, and his eagerness to transcend earthly and temporal life to confront the unknown. It will become evident that his search for philosophical and speculative scientific knowledge had a strong religious concern. In a cosmological relation Poe used science as a means to infinite, God-like knowledge. He wanted to reach the essence of God-to identify himself with the Almighty. These then have been my limits and determinations in this thesis.

1.2. Review of Previous Criticism

Edgar Allan Poe has been a controversial figure in literary criticism ever since Rufus W. Griswold published his obituary article two days after Poe's death. In September 1850 appeared the official Memoir in which Griswold drew an ugly and distorted portrait of Poe*. It was this conception of Poe as a man of unprincipled character that later colored the estimates of most biographies of Poe, published both in England and the United States. A glance at the estimates which have come from some critics may help us better understand the variety of meanings that Poe's work has had. Most biographies and criticism I have at my disposal do not consider Poe's scientific stories as their main concern. However, I will try, whenever possible, to present their opinion in connection with the themes I have chosen to discuss in the present study.

The best life of Poe which is still in print is Arthur Hobson Quinn's Edgar Allan Poe : A Critical Biography (1941). Quinn relates Poe's literary background better than any of his predecessors, due probably to new materials which had been placed at his disposal since the 1920's. He presents some of the most significant of Poe's letters for the first time, as well as a great deal of new data regarding accurate records and dates. In fact, Quinn shows an acute desire to expose the inaccuracies or omissions of his predecessors, such as Griswold's forgeries and the complete Army record of Edgar Poe. Quinn is quite competent when he treats Poe's life ; he is my major source in the biographical chapter of this paper. His book is based upon contemporary and personal knowledge of Poe and later scholarly research. Yet, I feel that in his attempt to dismiss the clouds which hang over Poe's reputation, he is sometimes too ready to defend him. It seems to me that Quinn's book is very dependable as a biography but it is not so complete as a critical study. The biographical

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* In 1849 Poe himself requested Griswold to become his literary executor in the case of his sudden death. Poe could not imagine that his future fame would be in the hands of his bitterest enemy.

information is extremely detailed but comparative little space is left for a more extensive criticism of Poe's tales. I would say that Quinn neglected mainly to analyze Poe's scientific interest more thoroughly. He does make references to scientific subjects when they are self-evident. He neglected, however, to look for repetition of important pseudo-scientific matters such as phrenology and mesmerism. Quinn mentions phrenology only slightly once when discussing "The Imp of the Perverse" and another time when he states that Thomas Dunn English, whom Poe knew, had written an essay upon this subject. Quinn does not even mention the "galvanic battery", a scientific apparatus which appears in many of Poe's tales, as we shall indicate. He also does not ascertain the image of gravity which is often evident in Poe's uses of whirlpools and abysses."The Thousand-and-Second Tale of Scheherazade" is of the most indispensable importance,for in it Poe gives proofs of his readings in many exact sciences. Quinn's comments on this tale, however, are restricted to :

> "Sinbad's cruise around the world in an armored cruiser gave Poe a good chance to depict modern inventions of all kinds in terms of the wonder of a past age." (1)

This is an example of how Quinn is sometimes too brief in his analysis regarding Poe's science. Of course, this can be justified on the ground that science may not have been the aim of his book.

After Quinn one may turn to Hervey Allen. Both of them are considered the major authorities on Poe. Allen's Israfel : The Life and Times of Edgar Allan Poe, 2 vols (1926) is out of print. Fortunately I have managed to find a Portuguese translation. Like Quinn, Allen is a very sympathetic biographer of Poe. He also makes use of the correspondence between Poe, his relatives and contemporaries, but not so much, nor in such a detailed and organized way as Quinn. His documentation and footnotes are somewhat unsystematic. In this respect his book is largely inferior in relation to Quinn's. Allen does allude to some interesting

speculations concerning science in Poe's short stories, as we shall verify when we examine them. Nevertheless, again this does not seem to have been his main purpose. He has a tendency toward the romantic and because of this his book sometimes loses the sober tone of a biography. He himself must have been aware of this,for Israfel was first projected as a novel. Allen's acceptance of some unchecked evidence is justified by the fact that when he wrote his book much of the documentation related to Poe's life had not been accounted for yet. Despite this Israfel is also a reliable biography.

As far as biographical information is concerned, Frances Winwar's The Haunted Palace : A Life of Edgar Allan Poe (1959), stands third to Quinn and Allen's books. She starts her biography with a picture of the times from the late eighteen century when Poe' mother came to America, and goes on to the end of Poe's life. In her study Miss Winwar sets out to give a psychological interpretation of Poe's writings and the circumstances of their creation. She shows us that everything appeared to be against Poe; that he had been doomed by fate. She emphasizes Poe's melancholia and drinking habits and seems to admit his insanity. Miss Winwar also hints that Poe wrote deliberately, taking subjects which at the time held people between fascination and wonder. She makes almost no comment regarding science, but a quote from her book may prove of some interest to our subject :

> "For Poe, the visionary, there was nothing extraordinary in that the spirit should force the prison of the flesh and attain the world beyond. It was one of the mystical currents of the times and he escaped it no more than did Elizabeth Barrett Browning, or Walt Whitman who was ever to be moved by night, sleep, death, and stars." (2)

The above quotation is noteworthy because it indicates Poe's preoccupation with the immortality of the soul, a subject which, we shall demonstrate, is tightly linked with Poe's use of science and his desire to transcend earthly ties.

In his book entitled Poe : A Critical Study (1957), Edward H.

Davidson undertakes a historical and philosophical inquiry into the mind and writings of Edgar Allan Poe. He tries to explain Poe's works within the framework of Romantic symbolism. His approach is primarily through the critical and metaphysical theories of Coleridge. Davidson deals with Poe's works (prose and poetry) chronologically. Half of his study is dedicated to poetry. On the whole, his main concern is with the imaginative and artistic implications of Poe's writings. Davidson is not always very sympathetic toward Poe. Like Miss Winwar he believes that Poe wrote with the primary intention of burlesquing the popular and best-selling tales in the magazines of the day. In the case of The Narrative of Arthur Gordon Pym , for instance, he states that Poe wished to capitalize on the popular interest in Antarctica during the 1830's.

I agree with Davidson when he says that,

> "Poe's science is also a religion - not the religion of any formal churches, but the religion of what a few men thought would be a scientific hypothesis concerning God at a time in Western thought just before the impact of Darwinian evolutionary ideas." (3)

As I shall note, Poe was removed from any doctrinal or dogmatic religion. He had a restless curiosity which would not rest content without trying to answer the riddle of the universe. In his quest for absolute knowledge he wanted to understand the mystery and the thought of God. One may consider here another remark made by Davidson :

> "In a large consideration of man's social and moral responsibility, Poe tried to relate man to the total order of the universe : the mind of God, from creation to the end of His scheme of time is exerted throughout all space; each part and element of creation is a manifestation of God's mind and will, throughout whatever existence it may have, tends to move toward unity or some knowable identification with the divine, primal order." (4)

This is a matter worthy of attention, for we shall presently argue that Poe's interest in science seemed to be closely related to his wish to understand God's ideas or the secret of the universe.

Henry Seidel Canby's Classic Americans (1931), is a study of

eminent American writers from Irving to Whitman, His methods of approach are social, psychological, and aesthetic. He begins by discussing in summary colonial literature for he believes that these writers are meaningless without the background and environment in which they lived. According to Canby, Poe's world differs from that of Thoreau, Emerson and Hawthorne in that the latter were seeking enlightment and Poe's purpose, instead, was to enlighten, to amuse, to impress. To be sure Canby's attitude in relation to Poe is not overly friendly. On the contrary, he emphasizes Poe's "neuroticism" and portrays him as a drunkard and erratic genius. He goes even further and lists Poe's maladies : sadism, incest, claustrophobia, perversion, paranoia, megalomania and egoism. For him two thirds of Poe's work is not worth reprinting, and of the remaining third not more than a half has any value whatsoever. In addition Canby charges Edgar Poe with fabricating sensation and mystery, like a cool craftsman, intuitive and inventive. He asserts that Poe used borrowed learning in the hope of showing off, and insists that Poe was mastering a market, consciously shaping his tales fitted to quick consumption :

> "It is often assumed that the trash Poe wrote was forced out of him by circumstance. I doubt it. The fudge was essentially Poe's, and Lowell was generous in his estimate of 'three fifths of him genius, and two fifths sheer fudge'. The same impulses that led him toward journalism account for much of his trash." (5)

Nevertheless, Canby adds :

> "I make a partial exception for science and mathematics and a complete one for aesthetics. In science and mathematics he had better than an average good training (of which more later), and when he borrowed he really sought the truth. He tried to be honest, and did hard thinking on an insufficient basis of accurate knowledge." (6)

This issue concerning Poe's pretended knowledge will also be treated throughout the development of this thesis. We shall express an opinion which resembles, to a certain extent, some of these critics' ideas. I do not agree with Canby fully. I think he is too radical when he considers almost the whole bulk of Poe's writing "trash".

I present arguments which indicate that although Poe did posses a certain scientific knowledge, (he himself admitted that) he many times borrowed scientific principles to give more verisimilitude to his fiction.

The central concern of Harry Levin in The Power of Blackness (1957), is with the workings of the imaginative faculty. As the title of his critical study declares, Levin searches for the occurrence of black themes and images which are common in Hawthorne, Melville and Poe, the three classic American masters of fiction. He deals with their individual situations and attitudes and gives a social, psychological and philosophical interpretation to their works. Levin examines some of Poe's scientific stories but often looking for black images rather than science. He also admits that Poe deliberately shaped his fiction to appear plausible :

> "The narrative of travel, a vehicle for the expression of the new world ever since the Elizabethan adventures, has been a primary mode of the intermingling of fact and fiction since the days of Herodotus; and Poe knew how to make his marvels seem practical by relating them in that 'plausible or verissimilar style'. He was well aware that the great age of exploration was not over." (7)

In Studies in Classic American Literature (1923), D. H. Lawrence includes an essay on Poe. He sets down his interpretation of Poe's writing based on Freudian psychology. The essay consists in large part of psychoanalytical comments upon "Ligeia" and "The House of Usher". He also gives a brief psychological approach to other tales such as "Eleonora", "Berenice", "The Cask of Amontillado", "William Wilson", "The Murders in the Rue Morgue" and "The Gold Bug". Lawrence maintains that Poe was concerned with the disintegration processes of his own psyche. He shows himself not to be a great admirer of Poe. He does not treat the scientific themes in Poe's works, except when he comments briefly on Poe's analytic mind :

> "But Poe is rather a scientist than an artist. He is reducing his own self as a scientist reduces a salt in a crucible. It is an almost chemical analysis of the soul and consciousness." (8)

But even here he is referring to a psychoanalytical topic which is the

double rhythm of creating and destroying.

Baudelaire on Poe includes the three major essays Baudelaire wrote on Poe (1852-56-57), as well as other notes and prefaces in which he interpreted Poe's works. His reaction to Poe is one of unbelievable sympathy. He shows the most profound respect for Poe. Baudelaire knew little about Poe's life or background. His essays suffer from a few omissions and errors caused by unverifiable sources. However, he always tried to collect every magazine he could find that contained Poe's works, and sought acquaintance with Americans in the hope of improving his knowledge of his idol. To make his translations really accurate, Baudelaire also struggled to improve his knowledge of English. Some critics have expressed the opinion that his versions are superior to their American originals. Others believe that he over-estimated Poe. He has spared no efforts to apologize and defend his fellow poet against all criticisms, personal and literary, which have been made against Poe. In his essays Baudelaire describes the origin of his enthusiasm toward Poe, and points out the resemblances and differences in their personality. Another point which he emphasizes is that Poe was misplaced in America; that he was too great a genius for America. Baudelaire says that in a democratic society public opinion is a dictator and he shows Poe's struggle in American soil. He readily justifies Poe's drunkenness and nomadic habits by saying that the antipathetic atmosphere of the United States was a cage for Poe. In a word, to Baudelaire Poe is the symbol of the alienated artist in frustrated rebellion against materialism. It is worthwhile to consider that according to Baudelaire's point of view, Poe deliberately cultivated drunkenness as a method of work. He gives particular stress to Poe's love of the beautiful and the superhuman and unearthly character of his work. I think, however, that he is very sentimental about his American idol.

It may be fruitful to mention that although Baudelaire admits the fact that Poe worked purposefully to give a scientific tone to his stories, admiration prevails :

"Who may I ask, who among us - I am speaking of the most hardy, -

> would have dared at the age of twenty-three, at the age when one learns to read, - to take off for the moon, adequately equipped with astronomical and scientific notion...? (9)

Another important consideration Baudelaire expresses is that in Poe's literature,

> "can be observed continually the glorification of the will applying itself to induction and to analysis. It seems that Poe wants to usurp the role of the prophets and to claim for himself a monopoly on rational explanation." (10)

Baudelaire is certainly alluding here to Bacon's inductive theory which was the prevailing scientific method during the first half of the nineteenth century. Baconianism will be studied in the following chapter.

In The French Face of Edgar Poe (1954), Patrick F. Quinn focuses his attention on Poe within the context of his reputation and influence abroad. But his book is mainly an investigation into the immense esteem in which Poe is held in France. Quinn tries to show that it was in France that Poe was most fully understood and that thanks to Baudelaire,Poe became a world figure. He starts with Baudelaire's first acquaintance with Poe's works and notes how the French poet was dedicated to Poe's translations and concerned with instilling in other readers some of his own enthusiasm. Indeed, Baudelaire is the central figure of this book. Quinn remarks that Poe was Baudelaire's alter ego and indicates points of coincidences in their thought. He admits that Poe was the ancestor of the Symbolists in poetry and critical ideas. Quinn observes that other critics presented a different theory from his own; that is, it was not the French quality of Poe's works, but the fact that Poe was typically American (scientific and rational), that appealed the French. In short, what Quinn investigates is how France reacted to Poe since the time Baudelaire made him famous there and how the French response to Poe may illuminate the understanding of his work in English.

A further difference between Quinn's approach and the approach of this thesis may be found in the following consideration. Quinn does not connect the image of the whirlpool with "gravity" as I have done. Rather, he gives a psychological explanation by associating the abyss or whirlpool with the force that urges man to seek his own destruction

This subject will receive a scientific approach in our inquiry. Quinn does not admit the supposition that Poe wrote his fiction deliberately :

> "It would be rash, however, to attribute Poe's sure handling of this kind of material to a sort of unerring instinct for what would most satisfactorily 'go'." (11)

He insists that there was a psychological as well as an artistic necessity which led Poe to write fiction.

N. Bryllion Fagin presents another phase of Poe's personality or a way to look at it in The Histrionic Mr. Poe (1949). He argues that Poe carried his histrionic or theatrical talents into the writing of poems and short-stories. Fagin suggests that Poe did not live his tales but acted them instead. In his opinion Poe's characters are not people but masks,and many of his poems, stories and essays are quite clearly theatrical performances. He maintains that Poe, child of actors, was himself, both consciously and unconsciously, an actor. For Fagin Poe was a strolling player with no theatre and his characters are projections of himself. In the main, what Fagin seeks is the symbolic and psychological significance of Poe's prose and poetry. He tries to defend his thesis so hard that one wonders why Poe did not become an actor like his parents. If Poe's talents were truly theatrical, why did he not write more dramas than prose and poetry ?

An argument Fagin presents in favor of his thesis of Poe's theatrical tendencies is what he calls "posturings" or pretentious exhibitionism. He discusses Poe's tendency toward lecturing, his overpowering need to exhibit his scientific interests and knowledge, like his tendency toward declamation. Thus Fagin searches for proofs to support his argument. He also notes Poe's life-long love of hoaxing, his delight in playing practical jokes and masquerading. He insists that Poe even managed to call attention to his misfortunes and that he managed equally well to dramatize his weaknesses. Fagin thinks that Poe often pretended to more knowledge than he possessed, and that he made a little learning pass for much profound erudition, quoting from ancient and sometimes mythical writers and philosophers :

> "Such fictions as 'Hans Pfaal', 'The Journal of Julius Rodman', 'The Narrative of Arthur Gordon Pym', 'The Balloon Hoax', and 'Mesmerism in Articulo Mortis', were passed off deliberately as news, actual adventure, and scientific investigation. His display of learning came pretty close to hoaxing : garbled quotations from obscure authorities; florid references to 'great' names, often non-existent, and scholarly annotations of his own work..." (12)

Although most of these critics do not treat Poe's scientific stories as their major purpose, I have attempted to show, to some extent, their opinion concerning certain themes which will be developed in my study. What seems significant in this review of criticism is that one can apprehend several different approaches to Poe's works. Science as a source of inspiration and as a form to reach something more important, which is the central theme to be analyzed in the present inquiry, is hardly mentioned by critics. They give brief comments regarding science in Poe, but they do not describe step-by-step the occurence of certain hitherto neglected themes which will become apparent in our analysis of Poe's short-stories.

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2. The State of American Science in the First Half of the Nineteenth Century.

According to George H. Daniels in his book American Science in the Age of Jackson*, there are several too-broad generalizations which are made about the condition of American science during the early nineteenth century. He presents four main points as being usually agreed upon :

> "1. Natural history, as opposed to the physical sciences, was the dominant research interest and, as such, accounted for the overwhelming bulk of American scientific work.* *
> 2. Science was dominated by interest in the practical, as opposed to the merely theoretical.
> 3. There was a marked absence of specialization during the first half of the century.
> 4. Science was still largely a pursuit of amateurs, whose main interests, or sources of livelihood, were elsewhere." (1)

These are preconceptions held by most American historians about Jacksonian Science. Daniels, however, refutes all of them with convincing statistical tables. According to table I, about the same number of men were involved in publication in Physical Science areas as in Natural History. Here lies a strong contradiction to the first of the preconceptions mentioned. It is true that not until 1876, after the appearance of the rail and telegraph lines, a really successful chemistry society was founded. Interest in Physical Sciences always existed, although it seems to have grown from 1840 on.

Refuting the second point listed, we find out that the bulk of scientific work was not being done in the fields of most immediate utility. Geology, for instance, attracted the majority of scientists, while botany would be much more useful because of its relation to medicine. Physicians urged research to begin to discover native drugs. Until this time American scientists had been more motivated by the advancement of knowledge than by its diffusion and utility. The unaccountable accumulation of data by expeditions and surveys-data which was simply collected,

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* Daniels is my major authority and source in this part of the thesis.

* * Natural History included sciences such as: geology, zoology, meteorology, physiology, botany, mineralogy, astronomy, paleontology and anthropology. Physical Sciences were: physics, chemistry, mechanics and mathematics.

classified and filed - also demonstrates that most American scientists had strongly theoretical interests.

With the increasing knowledge about nature, sciences became more and more complex toward the middle of the century. A division of functions became necessary and professors divided their subjects. Science had outgrown the capacity of one man. It had passed out of the public domain into the hands of professionals. Daniels argues that there were specializations in American science in the first half of the century, and proves it by pointing to an increased number of journals and societies in specialized fields.

In the eighteenth century the gentleman amateur had been the prototype of the man of science, and his home had been the private laboratory. Before 1800 a single professor taught all the sciences included in the subject called "Natural Philosophy",in most universities. It was the amateur type trying to involve as much scientific knowledge as possible, though in a superficial way. Later comments will show that Edgar Allan Poe, although a product of the nineteenth century, fitted the amateur type of scholar. By the mid-nineteenth century, the new type was the trained specialist, the professional whose support derived only from his scientific employment at colleges or universities. Most scientists were trained professionals, having attended medical schools or colleges where scientific instruction was offered. Again Daniels demonstrates with his statistics that only a few scholars could be called self-educated in science. Thus he shows us the real state of science at that time.

One might first consider the main scientific concepts current in America at that period and then undertake to show in other chapters how Poe's scientific works were either derived or in flight from the place and time in which he lived. A brief analysis of the time preceding 1815 will be given as necessary ground work for a better development of the main ideas concerning American scientific thought during the period 1815 to 1850.

Before the breaking of colonial ties with England, Americans were used to going abroad to get an education or sending reports, for direction or publication, to scientific societies in London. They would also send specimens to be analyzed,and sometimes named and classified there. In short, Americans took advantage of the access they were allowed to

English libraries, museums, and publication opportunities. In fact, they even seemed to share the pride of Britain's scientific eminence since they were both part of the same Empire. Daniels states that,

> "England had produced Herschel, Lyell, Darwin, and Joule; France could boast of the completion of Lavoisier's chemical revolution, of the revolution in medicine brought about by Pierre Louis and the Paris clinical school, of the fundamental contributions of Ampere, and of a host of pioneers in various other fields of science; and German science was represented by the lasting achievements of Schwan, Meyer, Liebig and Von Helmholtz."(2)

America had no such eminent name by the nineteenth century. There were, of course, Franklin, Rittenhouse, and the Philadelphia circle but official English science tended to dismiss them as tinkerers.

After Independence, however, great changes took place in the mentality of American people. The once imperial pride gave place to national shame; that is, American scholars felt they were already capable of providing for themselves what had one day been provided by other countries. They wanted to extend their political independence to economic and scientific independence. The new republic, they hoped, would solve all the problems. With the revolution an intense sense of nationality had grown in them. The faith and optimism of the independent Americans towards the growth of science can be well illustrated by the words of Daniels :

> "It would promote the economic interests of the people generally - the small businessman and the mechanic as well as the rich merchant and the large farmer - and it would bring relief to the sick and the destitute. A new and far better world was not only possible but just around the corner in America." (3)

Regardless of their faith, the obstacles presented to Americans were not few. As I have already pointed out, the dependence on England and other countries had been enormous until this time. Being independent, Americans found themselves unprepared to do the jobs formerly done by others. The new republic did not have the basic instruments needed, nor technicians to make them. The scarce supply of necessary apparatus imposed severe limitations on the American scientists. If, by any means, they managed to get equipment from Europe, it was difficult to replace it when lost or broken. The situation was the same in all branches of Science. As a consequence, the old state of the transatlantic relationship between American

and English scientists continued during the first few decades of independence. Medical schools were developed at the College of Philadelphia, at Kings College in New York, and at other places. American physicians, however, still preferred to seek training abroad. Although this state of dependence persisted, a growing number of native scholars were against it and found it shameful to the republic. Despite their struggle, the first books on the wealth of natural history in America were not published on American presses. Even the description of the collected plant specimens of the Lewis and Clark Expedition was published in England. Two reasons were generally given for the backward state of American science according to Daniels :

> "the necessity of working for a living in a democratic society, and the lack of either private or public patronage for scientific research." (4)

Yet, other reasons certainly contributed to the early failure to establish a national scientific community such as the vastness of the country, its scattered population, difficulties in transportation and communication. In addition, Americans had been very busy with founding a nation and settling its territory. There had been no time left to pay attention to science. With so many urgent things to be done, they probably could not have seen any use for science which, by that time they could not even afford.

The close of the War of 1812, considered the final achievement of American Independence, introduced still more direct patriotic appeals. Americans often compared the British support of science to the American's lack of support in order to awaken a sense of patriotism. By the beginning of the 1820's societies analogous to the "American Philosophical Society" (the first learned society in America founded in 1769 in Philadelphia) and to the "American Academy of Arts and Sciences" (founded in 1784 in the Boston area) were in operation in many states. New Societies and Institutions multiplied rapidly until 1825, when there was a decrease but they never died out. Societies dedicated to Natural History* were more successful because

they could depend on amateur enthusiasm and support. The scientific societies provided a meeting place where scientists coordinated the work of trading specimens between states. Sometimes a wealthy society financed explorations. Societies also served an educational purpose,for they freely opened their collections to students. In a real sense, such societies served as the universities of their time.

Parallel to the proliferation of scientific societies, journals began to flourish. The journals were founded to disseminate scientific ideas and findings. The number of periodicals publishing scientific material more than doubled between 1815–1825, when twenty-five such journals were in publication. The centers of publication were New York, Pennsylvania, and to a lesser extent Massachusetts and Ohio. Special interest journals (fully scientific) were unable to survive because there was not a large market for them. All of these journals contributed to the growth of science in America, but it was the founding of the "American Journal of Science and Arts" by Benjamin Silliman in 1818, that marked a new era in American science. It was the first truly national scientific journal which managed to survive. It was published until Silliman's death in 1864.

The period between 1815 - 1845 was the era of innovations in transportation and communication - it was the era of steamboats, railroads, canals and turnpikes. During the first few decades of the nineteenth century, there were projects for the establishment of a national university or a government-financed laboratory. Erecting a telegraph line and attaching civilian scientists to military expeditions were also plans being discussed. These internal improvement projects increased with each administration from Jefferson through Jackson. Andrew Jackson had become well known for his veto of one federal highway project. Even so, it was under his administration that a national observatory was founded. Government activity turned to the main preoccupation of the American people at that time : the conquest of their continent and exploitation of its natural resources. Geographical research dominated the sciences in America. Large numbers of investigators began the practical task of describing the physical and natural characteristics of their nation. Congress would approve only

mercantile expeditions. The Constitution had given Congress no power to give funds to purely literary or scientific research. Expeditions were supposed to serve military, commercial, industrial, agricultural and mining interests. Jefferson considered both purposes important but he had to call Lewis and Clark's Expedition mercantile only so that it could be approved by Congress. Poe mentions this expedition briefly in The Narrative of Arthur Gordon Pym . The expedition only left Pittsburg in the spring of 1804 and explored the region as far as the Rocky Mountains. Irrespective of Congress' appeals, government-financed expeditions were expected to bring back botanical and mineralogical specimens, as well as to study the Indians' language, religion and manners. Nevertheless, sciences which required laboratory work were not given support.

About 1820 West Point practically dominated the field of engineering education in America. West Point graduates supervised most of the Railroad Surveying. Between 1824 and 1838 the government used military engineers to make sixty-one railroad surveys(5). Because of its connection with astronomy, surveying was considered to be a genuinely scientific occupation during the early nineteenth century. Large scale government financed surveys were: the "Mexican Boundary Survey", the "Pacific Railroad Survey", and the "Coast Survey". The public received an enormous benefit from this early investment in science. In geological surveys, as in the expeditions, the surveying scientist would collect botanical, zoological and mineralogical specimens. They often discovered water, sometimes gold or petroleum on the frontier. The specimens were distributed to colleges within the states. The scientists also had to write reports which, when printed, were available to educational and scientific organizations. Surveyors also laid out transportation routes or canals and helped in the development of the agriculture of the region.

With the opening of the west by the surveyors during the decades of the 1830's, the population started moving away from the seaboard. Industries were springing up as well as new means of transportation. All these factors along with the ever changing conditions in agriculture demanded a deeper knowledge of nature and resources for the economic expansion of the country. With the addition of new states to the Union speculative tendencies appeared. The residents of new states were anxious

for financial prosperity by exploiting their economic potentialities. The existing colleges and societies could not answer all the new questions from,

> "people who wanted to know where to build a factory, a mine or a railroad; from a turnpike or canal company which knew that roads and canals should be located where there would be the most commodities to transport; from land speculators who wanted to know about the productivity of the soil in the unsettled areas of their states. The state governments themselves entering for the first time into roadbuilding on a large scale, knew that in order to justify large expenditure for roads, new needs for them should be developed and the long-range potential of the area should be assessed."(6)

During the boom eras of the 1830's and 1850's, economic interests themselves such as miners, farmers, turnpike and canal companies, and industrial groups, desired the creation of surveys in order to hasten the economic exploitation of their regions.

"The Great United States Exploring Expedition", under the command of Lieutenant Charles Wilkes, spent four years (1838/42), exploring the Antarctic, the South Pacific and Pacific Northwest. In the appendix of The Narrative of Arthur Gordon Pym Poe alludes to this governmental expedition then preparing for the Southern Ocean; which, he hoped, would verify or contradict his statements in relation to those regions. The "United States Botanic Garden" and the "United States National Museum" were founded with the specimens collected by this expedition. This partnership between government and science provided a whole generation of scientists with training in the expeditions and surveys, at a time when there was hardly any other scientific employment. New scientific specialities were created and the consciousness of the need for organization was great. Geologists were the first group to organize successfully. The opportunities for professional employment offered by government gave rise to new scientific societies such as the "American Association for the Advancement of Science" and the "National Academy of Sciences".

Some scientists tried to go beyond facts, into philosophical speculations; however, scholars against hypotheses probably constituted the majority from the 1820's on. They shared the public's suspicion that a certain group was more interested in some kind of theoretical research than they were in practical applications. Daniels states that:

> "The public understood the value of steam engines and other examples of useful technology, but it was not so evident to the popular utilitarian mentality that learning what heat was or whether electricity was composed of one fluid, two fluids or none, was useful in the same sense that, say designing a better safety valve was useful..." (7)

Attack upon theorists lasted throughout the period but it was characteristic of the 1840's. From then on, convinced empiricists, the great majority of American scientists, began to search for more local practicality instead of universal and abstract investigations.

Around mid century, government support would be given for scientific projects only when immediate utilitarian gain followed. Following the example of the "Agricultural Society", other organizations of more limited scope were founded. Eager enthusiasts for education wished to help in the educational uplift of the common man, moved by the Jacksonian idea that education should be available to all men. The Lyceum had become the main vehicle of popular information and by 1834 there were already 3,000 lyceums in the United States. Sixteen new colleges were founded since Silliman had been appointed to his chair of chemistry at Yale in 1802, and in the decade after 1821 twenty three additional colleges. Lyceums, Colleges and Universities were favorite places for important lectures. After the 1830's lecturers were asked to avoid chemical phraseology for, sciences had become too complex for the layman. Lecturers were urged to make science appear more popular by emphasizing the practicality of science, social democracy and religion. On the practicality of science Samuel Tyler gives us an example of the preaching-like persuasiveness of lecturers at that time :

> "To give some account of the philosophy of utility - the philosophy of lightning rods, of steam engines, safety lamps, spinning jinnies and cottom gins - the philosophy which has covered the barren hills and the sterile rocks in verdure, and the deserts with fertility - - which has clothed the naked, fed the hungry, and healed the sick - - the philosophy of peace, which is converting the sword into the pruning hook, and the spear into the ploughshare". (8)

This kind of appeal had become common towards the 1840's. Because of the

complexity of their subjects, some scientists and lecturers abandoned the effort to spread scientific understanding. They just tried to convince the public by telling wonders. Professional lecturers did not find much sympathy; only the "popularizers".

By 1842 technical schools began to spring up; the country needed better farmers, merchants, and mechanics instead of aristocrats. Science, then, became subject for all.It was the long - awaited democratization of knowledge. Willian Ellery Channing* explains the democratization of science in America :

> "Science has now left her retreats, her shades, her selected company of votaries, and with familiar tone begun the work of instructing the race. Through the press, the discoveries and theories, once the monopoly of philosophers, have become the property of the multitude."(9)

Speculations grew to such a degree that the democratic society began to fear that charlatanism would gain control. Oliver Wendell Holmes commented that,

> "the ultra-radical version of the axiom that all men are born free and equal....has invaded the regions of science." (10)

Democracy had given rise to a hatred of all authority. This hostility of democracy to professional expertise provoked the appearance of homeopaths, mathematical quacks and practitioners of botany and other fields of learning. The earlier hostility towards science had only been overcome during the second quarter of the nineteenth century, after the growth of urbanization and industrialization, and the spread of public education. The situation had changed completely. Americans had now become more preoccupied with the diffusion than with the advancement of sciences.

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* Willian Ellery Channing (1780-1842), U. S. clergyman, author and leading spokesman for Unitarianism.

During the first half of the nineteenth century most American scientists were deeply religious men who insisted on reconciling their work with their religious beliefs. The threat of the universe being a great cosmic machine propelled by its own forces and laws, without divine control, was rejected by religious minds. Developments in cosmogony, geology and natural history had brought proof of divine activity in the history of the earth. Paleontologists and geologists could not explain their findings by physical mechanisms. In the medical world wild speculations circulated over what constituted the essence of life. Conservative scientists attacked the chemical doctrines of life which deprived man of the soul and made him a complex chemical machine. For them no scientific law could explain the beginning of life. Most people thought that such a cause was already known for,

> "the earth was made for man, there had been purpose in its creation, and every topographic feature testified the omnipotence of the Creator".(11)

Scientists and layman in general were led to admit a Creator. It was not necessary to go further and search for God in the origin of things for God had created the Universe. He had been the great mathematician. It seems that most American thinkers of that period appeared to owe about equally to Francis Bacon, to the Scottish commonsense realism and to Evangelical religion. The strongest remaining critics of the new Baconian empirical science * were Prominent Roman Catholics, both theologians and laymen, and also High Church Episcopalians. Being more conservative than Protestants, they feared the dominance of science over their religious beliefs. They believed Bacon to be an atheist, and his theory consequently leading to atheism. This appeared to be a convincing argument for American Catholics in rejecting Bacon's methodology which was clearly a Protestant philosophy of science in America. Most of the leading interpreters of Bacon, like Samuel Tyler were ardent anti-catholics.

The old harmony between nature and religion remained until

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* Bacon's scientific theory and methodology will be discussed in chapter 4.

revolutionizing ideas such as Darwin's in his book The Origin of the Species (1859), aided science to reach conclusions opposite to the religious view of life. Finally one comes to the conclusion that most people protected religion above all, consequently holding back much of the progress America could have achieved in Science by the mid-nineteenth century. Towards the end of the first half of the century, the major problems of theoretical science of the beginning of the century had been formulated. Topics considered important in the 1820's and 1830's were put aside. Scientists began to deal with controversial subjects which were appearing such as Evolution, Thermodynamics, Mesmerism and Phrenology.

The first half of the nineteenth century was a period of great achievements in scientific discoveries and of great adventures. American science during this period was theoretical, specialized, professionalized and concerned with physical sciences, according to Daniels. All these changes affected the American society, and they certainly affected Poe. In that respect then, Poe was unusual since he was neither specialized nor professionalized although he was both theoretical and concerned with physical sciences. In short, he used science as it suited him to produce ideas for his stories. It was among the ambiguities of this transitional intellectual era that Edgar Allan Poe lived his short life. His relationship to many of the issues treated here will be clearer when we turn our attention to his work.

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3. Edgar Allan Poe and his Environment.

3.1. The Heritage.

Edgar Allan Poe was born in Boston on January 19, 1809, the son of a traveling actor and actress. He was the second of the three children in his family. Misery and bad luck seem to have haunted the family and Poe was also destined to lead a tragic life. Edgar's father David Poe Jr., had been advised by his father to the study and practice of law in Baltimore. Nevertheless, his distaste for the subject and a sheer love for the theatre led him to make his debut on the stage of Charleston Theatre in December of 1803 when he was only nineteen. He had alienated his family by giving up the respectable career of a lawyer and marrying an actress in 1806. Elizabeth Hopkins, Poe's mother, a young widow at eighteen, had played "leads" in various theatres in Charleston, Richmond, Baltimore, Philadelphia, New York, Boston, and other theatrical centers. A talented actress since she was nine years of age, she was apparently a charming person. She had followed a profession which had also been honored by her mother Elizabeth Smith, an actress at London's Theatre Royal, Convent Garden Theatre. David Poe however, seems to have been only a passably good actor. He had been none too happy in his performances. Critics were cruel, many times savage in their attacks on him, while Elizabeth Poe was highly praised and drew the plaudits of audiences. His instability led David Poe to seek solace in the bottle. It was his over-fondness for alcohol, which would later lead to theories about Edgar Poe's inherited infirmities. The combination of actual ill health and a tubercular tendency aggravated by drink and unfavourable criticism brought on despair for David Poe. All this must have been partly responsible for his deserting his wife. David Poe Jr. disappeared from recorded history late in 1809 or shortly thereafter. Nothing was ever heard of him again. Elizabeth Arnold Hopkins Poe's last season happened to be in Richmond, where she died of tuberculosis at the age of twenty-four on December 8, 1811, leaving her three little children-

Willian Henry Leonard Poe (born 1807), Edgar Poe, and Rosalie Poe (born 1810). Childbearing, the hardships of theatrical life, meagre salary and frequent moving about, had weakened her delicate organism. By the time she died Elizabeth had played 201 different roles; some of them as partner of important actors such as John Howard Payne.

3.2. Orphanhood.

Because of Elizabeth and David Poe's wandering life and financial difficulties, Willian Henry, their first child, was provided for by his grandfather David Poe Sr., since he was a baby. It was only in 1807 that the reconciliation between David Poe and his father happened. Henry Poe at first had been left with his paternal grandparents temporarily. His parents occasionally sent small sums for their child's maintenance. Gradually the allowance ceased and little Henry's provisional stay became eventually a permanent adoption with the death of his mother. Henry Poe also had ambitions to literary fame and managed to print some poems but they were not well accepted. He died in Baltimore after twenty-four unsuccessful years, rendered so in part by alcoholism. Rosalie Poe was taken in by Willian Mackenzie and his wife, of Richmond. Rosalie seems not to have been close to Poe later. She was subject of rumors concerning her illegitimacy, for Elizabeth had been abandoned by David Poe when in the fourth month of pregnancy. Rosalie was always a pathetic figure and failed to develop mentally after she was about twelve years old. She died in 1874.

At his mother's death little Edgar, who was three years old, was taken into the home of John Allan, a Richmond tobacco exporter and general merchant, at the urging of his wife Frances. They were childless and John Allan apparently welcomed Edgar into his comfortable home as a son; although he never legally adopted the boy and left him nothing in his will. It may have been due to Allan's prejudice against a child of strolling players. John Allan had come to America from Ayrshire, Scotland, as a lad of fifteen, to work under his uncle, a well-to-do merchant called Willian Galt, who had been serving Richmond for several decades. Young John Allan profited so much by his experience that at twenty he entered commerce on his own. With his cousin Charles Ellis, the shrewd Scotsman

established the junior firm Ellis & Allan, each partner furnishing half of the capital. Allan was a man exact in his business relations, competent and progressive; one of that rectitude which would sooner break than bend. It was this last trait of his character that later led him to break with Poe. Of Frances Allan we know comparatively little. She was fond of amusement, and had ambitions to take a prominent part in Richmond social life. She was constantly sick and many times recurred to hydrotherapy. In her letters to Allan during her absences from home, Edgar is not mentioned in her remembrances. This shows a certain selfishness on her part. If Mrs Allan was competent to bring up a boy like Edgar is an open question. Notwithstanding her nervous temperament, there is plenty of evidence both in Poe's letters and in the writing of others that Mrs Allan loved him and he loved her. Miss Nancy Valentine, Frances Allan's sister, lived with the family, but one also learns very little of her attitudes. In letters to friends, Allan says that Edgar was a fine boy and that he had no reason to complain of his progress. In a sense, Poe enjoyed a certain measure of security in his early childhood, which was never to be his again after he left home. He was well liked as a boy, both by his teachers and his friends, and was a leader in the sports of childhood, particularly swimming at which he excelled.

3.3. Education.

Poe was educated not only by regular schooling and by reading, but also by intercourse with the guests and friends of John and Frances Allan. When Edgar was old enough to learn his letters, he was sent to a dame's school of Clotilda Fisher. From there he soon graduated to Mr. William Edwing's Academy for boys, also in Richmond. Records show that on January 1814 Poe was attending this school. Not even a year had elapsed when in 1815 Ellis and Allan decided to establish a branch house in London. After a sea voyage of thirty-five days they arrived in England on July 28, 1815. The Allans first went to Irvine Scotland, to visit John Allan's sisters. Letters of 1816 show that it was a bad year. The family was dissatisfied with London, the economic crisis and the weather. The

discouraging commercial conditions, however, did not keep Allan from attending to Edgar's education. In London he was sent to a boarding school kept by Miss Dubourg, at 146 Sloane Street in Chelsea. Later Edgar would use her name for the laundress in "The Murders in the Rue Morgue". The first bill for tuition, presented by Arthur Hobson Quinn, indicates that Edgar was studying geography, spelling and church catechism. Despite the British depression which followed in 1817, Allan sent Edgar to a better and more expensive school. The Manor House School was conducted by the Reverend John Bransby at Stoke Newington, then in the country, but near London. Reverend Bransby knew a great deal about botany and gardening. It is probable that Poe was impressed by his master for he himself became interested in these subjects later in his life. In his tale "Willian Wilson" Poe described in terms of fiction this boarding school and its master. Edgar stayed at Bransby's school from six to eleven years of age. John Allan was glad with the boy's progress at school as he showed in a letter to his uncle :

> "Edgar is growing wonderfully and enjoys a good reputation as both able and willing to receive instruction." (1)

The English soujourn was fortunate for Poe for he was later detached from the provinciality which was inevitable to those whose visions had been restricted to their native land. The rigid English education may certainly have contributed to Poe'e disciplined mind. The gothic atmosphere of the Manor House School, the effect produced by the architecture, and the survivals of past ages provided him with many details he was later to make use of in his fiction. Edgar also saw, before the majority of American boys, the beginnings of industrialism and of the railroad in England and Scotland. Nor was the ocean with its terrible wonders ever erased from the little boy's memory. His later interest in sea voyages possibly began with his trip to England. Two transatlantic voyages and life spent around harbours gave Poe a familiarity with nautical costumes and vocabulary which he would one day use in The Narrative of Arthur Gordon Pym.

Shortly after the return to Richmond, on August 2, 1820, Edgar was sent to the school of Joseph H. Clarke. From June to September 1822, Poe studied Horace and Cicero in Latin and Homer in Greek. These items indicate that for a boy of thirteen Poe was well advanced in these ancient languages. On April 1, 1823, John Allan entered Edgar in the school of William Burke where he seems to have remained until he was sent to the University. In the new house John Allan bought after he inherited the fortune of his uncle Willian Galt in 1825, there was a wide porch where Allan placed a telescope he had brought from England. From it Edgar learned his first lessons in star-gazing when he was only sixteen years old. It is likely that his passion for astronomic and cosmic speculations began to arise by that time.

Edgar Allan Poe entered the University of Virginia on February 14, 1826. Jefferson's university was then in the second year of its existence. Poe probably met Jefferson, but there is no record of any impression being made upon the young undergraduate by the founder. The essence of Jefferson's ideal was freedom, from the choice of professors to the selection by the students of their courses of study. Edgar studied Latin and Greek as ancient languages, but he was more interested in the three modern languages he had also chosen : French, Spanish and Italian. He excelled in French and was also good in Mathematics. The effect of his readings at the university was mainly felt in his poetry. One learns from Hervey Allen in his book Israfel, that while at the university Poe used to pay visits to a professor Tucker who was writing a book called Voyage to the Moon at that time. Allen believes they talked about "spacial trips" and hints that Edgar followed Tucker's model in "The Balloon Hoax" and "Hans Pfaal". (2)

Poe wrote two letters to John Allan during the time he was at Charlottesville. They seemed to be on good terms for his foster father had sent him some clothes. In these letters Edgar talked about disturbances, fights, gambling, in short, about the difficulties under which discipline was administered. Jefferson's ideal of student self-government had not

worked. It can hardly be doubted that an environment like this was unfortunate for Poe. It had been his first test of self-guidance. The atmosphere was not particularly conducive to study and he was too young not to be influenced by it. It was there that he started playing cards and drinking. He blamed his foster father for not sending him enough money; not even for the charges of the institution. Edgar became desperate and gambled, until he was involved irretrievably in debts. By the end of the first year, although there was no record of any disciplinary action concerning Poe, and despite his excellent scholastic record, John Allan did not permit him to continue at the University. He also declined to pay Edgar's debts which had been set at $ 2,500. Poe thought Allan would find him a job or would have a change of heart, but he never did. A decided change had come over Allan's relationship with Edgar. John Allan possibly wanted Edgar far away from Richmond for fear of his finding out his infidelities. (3) Later when Allan died his several illegitimate children were amply provided for, but nothing was left to Edgar Allan Poe.

The close of Poe's term at the University of Virginia marks the end of his regular education. The scenery of Charlottesville pictured in many of his stories shows that Edgar did enjoy some phases of his university career. His training both in school and college was limited largely to the ancient and modern languages which evidently helped to develop his power of expression. There is no record indicating whether Poe studied any science or not. Though limited, the subjects he studied were appropriate for an artist. Information in history and science which would have been present in a broader curriculum, Poe sought later in his readings. One may say that he was self-taught in science. Edgar's relationship with Mr. Allan had become tense and unhappy some time before he entered the university. It seems that Allan would rather have made Poe a businessman like himself. He did not see how the career of a poet could be profitable. Upon Edgar's return from Charlottesville their relationship became intolerable and he left home.

Poe enlisted in the United States Army as a private soldier on May 26, 1827. The fact of his giving his name as Edgar A. Perry, born in Boston, and his age as twenty-two, makes clear that he intended to disappear and probably did not have any liking for a soldier's life. He was assigned to Battery H. of the First Artillery in Fort Independence, Boston Harbor. On October 31, 1827 his battery was ordered to Fort Moultrie, on Sullivan's Island, Charleston Harbor. They stayed there until December 18, 1828 when the battery set sail for Fortress Monroe in Virginia. On December 1828 Poe had already decided that he was wasting his time in the Army. In a letter to John Allan, in the tone of a repentant son, he asked his written permission to withdraw from the service. As Allan denied it Edgar had to pay a fee before leaving. Poe served as an artificer from May 1828 to January 1829, when he was promoted to the rank of Sergeant Major, the highest non-commissioned grade in the Army. This promotion shows the ability with which he had conducted his duties. Before leaving the post, Poe collected testimonials of his good conduct from his officers to use in connection with his application to enter West Point Military Academy. John Allan finally agreed to write a letter of recommendation and gave Edgar two hundred dollars at that time. Perhaps this was the price he was willing to pay to have Poe out of Richmond. Frances Allan had died on February (1829). All these unhappy events certainly affected Edgar seriously.

Shortly after his enlistment in the Army, Poe's first volume of Poems, Tamerlane and Other Poems, (by a Bostonian) had been published, probably in the early summer of 1827. In "Tamerlane" Poe introduced an astronomical subject he was often to use later - the moon. The region surrounding Charleston where Poe served in the Army, made a lasting impression on him. He uses the description of Sullivan's Island in the opening scene of "The Gold Bug". In this story Poe attributed to his hero Legrand some of his own traits and habits while he was at Sullivan's Island. He says in the story that Legrand "saunters along the beach and through the myrtles in quest of shells and entomological specimens".

Poe's interest in shells, which led him to accept, in 1839, the task of rewriting Wyatt's textbook on Conchology, may date from this period. At the time Edgar was at Sullivan's Island (1826) Dr. Edmund Ravenel lived there, a conchologist of distinction. It seems most probable that they met and Edgar may have received his inspiration from him. It was also in "The Gold Bug" that Poe showed his interest in cryptograms and zoology, giving scientific names such as scarabeaus caput hominis to the bug. The travellers across the ocean in "The Balloon - Hoax" landed on the beach of Sullivan's Island.

While in the Army, Poe was a young poet already preoccupied with semi-scientific observations. It seems that he was ashamed of the Army period for he did his best to conceal it. To fill in the gap of time spent in the Army Edgar invented episodes such as a trip to Europe. Nevertheless, the dates of some of his letters prove that he had not been out of the United States during that time. While Poe waited for the West Point appointment, Al Aaraaf, Tamerlane and Minor Poems was published in December 1829. As a preface to "Al Aaraaf" Edgar published his first sonnet, without a title. Later he would call it "To Science". It was an attack upon science. Poe thus early takes his place among the many men of letters of the nineteenth century who were impatient of the dogmatism of science. He was among the few who saw the harm that the machine era was bringing. In this sonnet he blamed science for destroying beauty and idleness. As a Virginian and also as an egoist Poe despised the demagogy and veneration towards progress. As an artist he painted the ugliness of industrialism. Poe's poems will not be dealt with in this dissertation, but in many of them like in "Israfel" he mentions his scientific observations as the eternal restlessness of the moons, breaking all natural laws. Edgar seemed to be a reader of scientific works even early in his life, and was to show all his life a keen interest in them.

It was during the last week in June, 1830 that Edgar Allan Poe took the entrance examination to West Point. It consisted of a test in reading and writing and the four ground rules of arithmetic. Edgar passed

and was admitted. During the two first months the instruction was entirely military. The academic studies began in September 1830. The main subjects were Mathematics and French, subjects familiar to Edgar. Official records show that Poe stood third in French and seventeenth in Mathematics in a class of eighty-seven. The daily schedule was quite strenuous. Cadet Edgar A. Perry began with his classes at sunrise , breakfast at seven, attended classes again from eight until one, from two to four. Then, there were military exercises until sunset; and after supper classes again until half past nine. The regulations were severe; drinking, smoking, playing cards, and such games as chess were forbidden, as well as keeping in the room any novel, poem, or other books not relating to the studies. All these restrictions must have annoyed the young poet. It was the custom for cadets to have an allowance from home. Once again Poe had no deposit to cover books and other expenses. John Allan had provided for the cadet no better than he had done the student at Virginia. Poe's dislike of the academy routine began to grow. Under such circunstances his creative work was interrupted. Entering the Academy he must have anticipated more leisure to write than he found there. Besides he knew that the Army was no place for a poor man. It was by this time that Edgar found out that he definitely could not depend upon Allan for financial support. With John Allan's refusal to help him he began to neglect his studies and duties at the Institution. As a result of his bad conduct a General Courtmartial was held on January 5, 1831. Cadet Perry was tried on "gross neglect of duty" and "disobedience of orders", for absenting himself from parades, roll calls and from the academic functions.The court found him guilty of all charges and decreed that he be dismissed from the service of the United States. Although Edgar's companions mentioned escapades to a bar after lights out , there was no charge that reflected upon his moral character.

In 1831 Baltimore was the $3^{\underline{rd}}$ city of the United States. Its boom had been due to the development of canals between Baltimore and Philadelphia and also to the construction of the Baltimore-Ohio Railroad. People gathered to see the "iron - horse" for the first time in 1831. Poe

had seen the harbour of New York in 1820, when he returned from England. It was then a little bigger than an enlarged colonial city. In 1831, a new image could be seen in the water and landscape. Factory chimneys had been scattered everywhere, steamboats had replaced sailboats. The problem of distance had been solved at a comparatively amazing and prophetic velocity. The era of wonders had begun.

By the summer of 1831 Poe was living with his widowed aunt Mrs. Maria Clemm and his cousin Virginia who made a poor but comfortable home for him. In 1835 we find them in Richmond where Poe had obtained a position as an assistant editor of the Southern Literary Messenger. They always suffered financial difficulties, for Edgar frequently lost his jobs due to his drinking problems. These two women were very devoted relatives who cared what became of him. On May 16, 1836, Poe married Virginia who was not yet fourteen years of age. He was twenty-seven. Mrs. Clemm continued with them after their marriage. Virginia once broke a blood vessel while singing at her piano. She was nineteen, and from then on she was always seriously ill with hemorrhages from the lungs. This certainly added to Poe's distress. He was constantly tortured by the sight of his young wife, still in her early twenties, periodically lapsing toward death. The disparity of their ages and the fact of Virginia being constantly sick has provided biographers with much material for speculation. Most biographers, however, seem to believe that they really loved each other.

3.4. The Editor.

Poe was editor of important publications during his life. Through John Pendleton Kennedy, one of the judges of the Baltimore contest in which Poe's tale "MS. Found in a Bottle" won the first prize, Poe obtained a position in Richmond as assistant editor (and then editor) of the Southern Literary Messenger, in August, 1835. Earlier in June of the same year Kennedy had secured the publication of some of Poe's short-stories in the Messenger. Among them was "The Unparalleled Adventure of One Hans Pfaal", which proves that Poe was interested in space exploration by that time. Other scientific tales were published while he was working at the Messenger :

"Loss of Breath" touches on the topic of galvanic electricity; "Maelzel's Chess Player", besides dealing with the mechanism of the machine (as an invention), is the first tale of ratiocination which indicates Poe's analytic mind. The first and second installments of The Narrative of Arthur Gordon Pym appeared in the Messenger in February of 1837. In Pym Poe treats scientific subjects such as geography, zoology, geology, physics (gravity) and cryptography, as we shall verify later. Most of it must have been written in Richmond, but Poe discontinued its publication after these two first installments. During this Richmond period, financial and drinking problems plagued Poe. After professional and personal trouble with Thomas W. White, owner of the Messenger, Poe was released in February, 1837.

The Poes then moved their household to New York City where Edgar's ambitions to find lucrative editorial work were frustrated, but where he did publish Pym in 1838. In the summer of 1838 the family moved to Philadelphia where a year later in June (1839) Poe became the assistant editor of Burton's Gentleman's Magazine founded by Willian E. Burton. During the winter of 1838 Poe worked on the Conchologist's First Book; or A System of Testaceous Malacology, published in Philadelphia in 1839. Burton's accepted "The Fall of the House of Usher" in 1839 (which contains slight references to phrenology). While Poe devoted his work to this magazine he wrote : "The Man that Was Used Up" (satire about a robot-like man) and "The Conversation of Eiros and Charmion" (about a comet which destroys the earth) . His book Tales of the Grotesque and Arabesque was published in 1840 by Lea and Blanchard's . Poe's connection with the Burton's Gentleman's Magazine ended with the June number of 1840.

In April, 1841, one still finds Poe in Philadelphia where he joined the staff of Graham's Magazine,owned by George R. Graham. This period was very productive. Poe helped to raise the circulation of Graham's from 5,000 monthly to 50,000 during the time he worked for it. It was during the period he stayed connected with this magazine that Poe published his first detective story "The Murders in the Rue Morgue" which is an account of his analytic powers. Many other stories related to science

are relevant to this time :"A Descent into the Maelstrom" (gravity); "The Island of the Fay" (God's perfection in the Cosmogony of the universe); "The Gold Bug" (cryptography)"; "The Colloquy of Monos and Una" (scorn for progress which polluted the world); "Three Sundays in a Week" (astronomy). Poe gave up the editorship of Graham's in May of 1842 but he must have written "The Mystery of Marie Roget", his second detective story, before leaving it for this short story was published some time after that. Meanwhile, Poe had been making the first of several unsuccessful attempts to found a magazine of his own. He dreamed his whole life of establishing a literary periodical which he could edit in his own way, printing only the kind of material he approved of. "A Tale of the Ragged Mountains" (which discusses phrenology and galvanic electricity) was published in 1843.

Poe and his family left Philadelphia for New York in April of 1844. For some time he contributed to several publications and was not attached to any permanent job. "The Balloon Hoax" was Poe's first tale published in New York in 1844. Other stories with scientific content followed such as "The Premature Burial" (galvanism), and "Mesmeric Revelation" (mesmerism). "The Purloined Letter", the third and most perfect of Poe's detective stories was published in 1845 in a "Christmas Gift" book. Poe's preoccupation was turning more and more to the power of analysis and imagination that transcends analysis. One can also observe, from this time on, Poe's growing ideas about science and God's volition.

In October, 1844 Poe started to devote his abilities and experience to the editorial duties of a daily newspaper, the New York Evening Mirror owned by Nathaniel Parker Willis and George Pope Morris. In November of the same year, Poe published the first installment of his "Marginalia" in the Democratic Review. These "Marginalia" were short or long paragraphs of the essay type, usually taken from his reading. According to Quinn, some of the "Marginalia" installments show Poe's interest in astronomical science.* Poe continued to publish these installments in other newspapers until 1849.

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* Since they were extracted from his readings, it is really regrettable that we could not obtain them. They would certainly be a great help in the study of Poe's scientific inquiries.

Later in March of 1845 Poe saw a better opportunity at the Broadway Journal, a weekly founded that same year by Charles F. Briggs and John Bisco. In July "Willey and Putnan" published Tales by Edgar A. Poe. Besides, Poe published six new stories in 1845, all of which dealt with scientific subjects: "The Thousand-and-Second Tale of Scheherazade" (physics, chemistry, botany, zoology, and other sciences); "Some Words with a Mummy" (galvanism and the advanced ancient Egyptian civilization); "The Power of Words" (God and the symmetry of the universe); "The Imp of the Perverse" and "The System of Dr. Tarr and Prof. Fether" (phrenology); "The Facts in the Case of M. Valdemar" (mesmerism - galvanism). Poe purchased the Broadway Journal in October 1845. He became its sole editor and owner. At last his long-awaited dream had become true. But his satisfaction was short-lived. Poe had to struggle for money to pay for his journal. In December (1845) he sold to Thomas H. Lane one half of his interest. Even Lane's help was not enough. Poe failed to secure the necessary financial support for the enterprise. All his efforts failed on January 3, 1846 when the journal expired.

During 1847 Poe had been working steadily on "Eureka", a mystico-scientific prose poem on the creation and evolution of the universe. Also in 1847 Virginia died of tuberculosis. After her death Poe collapsed physically and spiritually. He had suffered privations, hunger and cold, in order to supply food, medicine and comfort to Virginia. Mrs, Clemm, his mother-in-law, stayed with Poe to the end of his life. In February, 1848, he read "Eureka" before the Society Library of New York City; it was in press early in June, 1848. "Mellonta Tauta" (a balloon journey in 2848), and "Von Kempelem and His Discovery" (alchemy) were published during 1849, Poe's last year of life.

The last days of Edgar Allan Poe are overlaid with rumor and suppositions. The fact that he was found lying in or near a polling place has given rise to comments of his having been drugged, taken from one polling place to another to vote as a repeater and then abandoned. But the real cause of his death remains uncertain. Poe was taken to the Washington College Hospital in a coma on the afternoon of October 3rd. He remained in a state of violent delirium which lasted until the early

morning of October 7th when he died, after three and a half days of suffering.

3.5. Religious Philosophy.

When Edgar was a boy he used to go to church every Sunday with the Allans who shared a pew directly in front of the pulpit. However, as Frances Winwar remarks on her book The Haunted Palace,

> "Edgar's life revealed that neither his sessions at Sunday School, nor the piety of Mrs. Allan, nor the eloquence of Bishop Moore left any mark upon a mind whose heaven and hell were to belong to its own universe." (4)

Baudelaire related Poe's theory of perverseness to the concept of original sin. This does not seem a convincing argument for the evil, the mal Baudelaire believed in was of a theological density that was quite foreign to the mind of Poe who was devoid of traditional religious convictions. As Patric F. Quinn points out in The French Face of Edgar A. Poe,

> "Poe never suggests that original sin, the Primal Fall, is responsible for this instinct for self-destruction ..." (5)

One of the rumors which was circulated by Poe's enemies after his death was that he was a radical atheist. Although Edgar made statements such as :

> "My whole nature utterly revolts at the idea that there is any being in the Universe superior to Myself ! " (6)

to charge him with atheism seems to be a very radical attitude. What Poe despised was the conventional pictures as those of heaven and hell. He was searching for a more precise way to discuss the relationship between man and the infinite. "Eureka" was an attempt to solve this problem, to work out a philosophy of death, a philosophy that would explain the soul's unification, upon death, with the larger spirit that Poe was convinced existed behind the appearances of the Universe. "Eureka" is not included in Poe's works to be analysed here*, but comments on it by some critics give us evidence that Poe believed in

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*"Eureka" is out of print and was regrettably impossible to obtain.

the first Divine act of Creation. For him God had been the great Mathematician of the Universe. Poe did seem to accept a Divine Entity. He does not mention religion in most of his short-stories. His characters are not Christian nor even pagan. Science appeared to be Poe's religion. In his book Poe a Critical Study, Edward H. Davidson's words best explain Edgar Poe's position regarding religion :

> "Melville renounced faith and yet was unable to accept science; Mark Twain tried to grasp science and was unable to let faith go. Poe, for his part, tried to swallow the new science whole and make it a substitute for the ritualized and dying faith in which he was reared." (7)

This then is the life of Poe, some of his movement from place to place, his prejudices, and this is how his interest in science developed during his lifetime . As one has asserted above, science seemed to have assumed the importance of a religion for Poe. It will be our business in this study to examine the science that was such a religious concern to him.

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4. The Scientific Mind.

To study the history of the American scientific community during the first half of the nineteenth century, it is necessary to follow the development of Francis Bacon's philosophy in its progress between 1815-1845. Baconian science reached its point of highest influence in the 1830's and early 1840's, the time-span generally called the "Age of Jackson". Baconianism was the theory accepted to underlie all scientific work at this time. Baconianism in practice called for collection, description and classification only. Nothing was to be assumed, no conclusions were to be stated that could not be proved by data. Americans believed they would reach an understanding of nature through such a technique. If the steps of Bacon's method were followed they would gain not only material and spiritual advantages but also an intense devotion to the Creator of all things. The Baconian philosophy so dominated the whole generation of American scientists during the first half of the nineteenth century that it had become fashionable to begin any scientific treatise with a remark on Bacon's inductive method. The appeal to the name of Bacon seemed to be a mark of scientific orthodoxy. Sometimes the names of Bacon and Newton were interchanged; probably because both rejected hypothesis. The thinkers of that time made no distinction between the scientific approach of the two men. Baconianism held that all science must rest on observation beginning with individual facts and following to broader generalizations. Baconian technique then was inductive and consisted of investigation and of collecting of facts and phenomena. Its opposite was Aristotle's logical deductive technique, as taught in his Organon. The deductive method followed the common process of reasoning, starting from general to more specific assumptions. Francis Bacon's method also claimed to be anti-theoretical, avoiding hypotheses and not going beyond what could be physically accessible, or directly observed. By the beginning of the 1830's the word "hypothesis" was avoided by the deeply religious mentality of that time since going beyond facts could be a threat to one's faith in God. On the other hand, facts themselves could serve as evidence for the existence of God, within the Baconian framework. However, these same religious scientists believed that by interpreting their facts,

by going too deep, they could lose their belief in the Creator. This strong prejudice in favor of God led them to avoid any clash between Science and Religion. American Baconians, therefore, agreed with the Scottish School of Philosophy founded by Thomas Reid. This theory was mainly based on the principle that,

> "man is so constituted that he cannot doubt the reality of whatever presents itself to the senses." (1)

Another point of Bacon's argument was that all science had to be identified with "taxonomy" or systematic classification.

Above all, the most predominant theme during this first stage of American science was, that Science was the great hope of mankind. Yet, by the early 1830's the first reactions to this optimistic view began to grow. Disillusionment with Bacon's philosophy was brought about due to two main points : more data had been accumulated than scientists could deal with; some scholars realized that it could not be applied to all research interests (unobservable facts such as heat for example). This new feeling marked a second stage in the development of sciences. On the one hand, some scholars tried to go "beyond facts", presenting wild hypotheses. These scientists were seeking causes and in their researches they were led to excesses and generalizations. On the other hand, the majority of American scientists were against hypothesis. They did not believe science had anything to do with causes but with facts alone and classification. For them reasoning had to stop when arriving at the study of such abstract and ultimate agents as light, heat and electricity which they considered the limits of science. Here is again evident the mentioned threat to religion.

Sometime in the late 1830's a third stage began. Some scientists discovered that they could extend the inductive process of Bacon through the doctrine of analogy. With analogy, they thought, they could overcome the difficulties presented to Baconianism and deal with the imponderable or ultimate agents already mentioned. Ohm deduced his law of resistance of a conductor by analogy between the flow of heat and the flow of electricity. By observing the mutual interference of waves in a river, Thomas Young arrived at the theory of light. Analogy was applied to botany, mathematics

and even to astronomy. Thomas Reid presented arguments to prove the existence of life on other planets by analogy with certain conditions existing on Earth. At a time when a great number of scholars were beginning to feel the limitations of pure Baconianism, analogy served as a mode to revive and defend the old kind of thinking. Analogy maintained the strong belief in Baconianism until the revolutionary ideas of Von Helmholtz and Darwin, by 1859, eventually destroyed it by using analogical thinking. Their theories shook the very basis of the old philosophy by denying the existence of God.

Towards the middle of the century sciences became more complex because of the increasing knowledge about nature. The complexity of such sciences as chemistry and physics was, in a sense discovered only after the disillusionment with Lord Verulam's theory. As I have already briefly noted, by the mid nineteenth century the data-collecting stage had come to an end in many sciences. Scientists had collected so much data that it had become unmanageable. Bacon's method had apparently exhausted its potentialities for some scholars whose religious commitment prevented them from going further. At the same time, another group of scientists began to realize that to collect, name, and classify a thing was not the same as to know it scientifically. Baconianism had confined researches only to what was directly observed, but the scientists felt that they could not ignore the fact that they had to take account of that which could not be physically accessible as well. The appearance of the newer scientific interests of the period like the study of imponderable entities such as light, heat, and electricity obviously demanded analysis beyond observable facts. No one could see an electrical current in action, and yet such a thing existed. Baconianism had not equipped Americans to handle such abstract matters :

> "to admit that there might be a matter which did not have weight--the electric fluid, caloric, the ether, light and magnetism - was an affront to the whole basis of Baconian philosophy". (2)

The researches in such abstract fields resulted in an esoteric body of knowledge postulated by scientists who did not adopt the defeatist

attitude taken by the ones who had not dared to go so far. The deficiencies in Bacon's methodology instead, had led them to overcome these difficulties in different ways.

The dissatisfaction with sterile accumulation of facts and the desire to explain new phenomena in science motivated these scholars to go from collection of observable individual facts to questions of origin, relationship, and of ultimate entities, questions that fascinated Poe. It was approaching the 1830's that this new stage began, when some scientists discovered that analogy would solve their problems. Many scientists were led to excesses and generalizations, but at the same time, very important contributions were added by other people of this group. Elias Loomis was studying terrestrial magnetism and meteorology. He made experiments with the magnetic needle variation during storms and concluded that neither whirlwind nor rain, were the vera causa of barometer fluctuations. Earlier abstract contributions to science such as Newton's "atomic theory", Hare's study of "repulsion and attraction" forces, Descarte's "elements and vortices", Laplace's "nebular hypothesis", "galvanic electricity", the nature and divisibility of matter, the connection between magnetism and electricity by Ampere, were also subjects being widely discussed.

Poe's relationship to these issues appears in his tale called "Mellonta Tauta". In this story he satirizes old philosophers such as Aristotle and Bacon. In an explanation very much like that of Daniels, already discussed in chapter three, Poe demonstrates that he was well aware of the scientific methods which operated during the time he lived. Whether he discusses Bacon's theory in order to show off, as it had become fashionable at that time, it matters not. A more important point is that Poe's understanding and criticism of Baconianism becomes evident in this short-story. To quote his comments :

> "It appears that long, long ago, in the night of time, there lived a Turkish philosopher (or Hindoo possibly) called Aries Tottle. This person introduced or at all events propagated what was termed the deductive or a priori mode of investigation. He started with what he maintained to be axioms or 'self-evident truths', and thence

> proceeded 'logically' to results. His greatest disciples were one Neuclid, and one Cant. Well, Aries Tottle flourished supreme until advent of one Hog, surnamed, the 'Ettrick Shepherd', who preached an entirely different system, which he called a posteriori or inductive. His plan referred altogether to Sensation. He proceeded by observing, analyzing, and classifying facts - instantiae naturae, as they were affectedly called - into general laws." (3)

By Hog Poe means Bacon. He proceeds by saying that Aristotelian and Baconian methods were considered the only possible ways to knowledge. He found this notion absurd for, confining investigation to facts, or to "crawling" as he says, Baconianism retarded the progress of all true knowledge. This last issue even Daniels failed to mention in his book. Poe reached conclusions that Daniels would be able to see only one hundred years later. Edgar Allan Poe seems to have been ahead of his time in this respect for he could see, at that early period, the deficiencies of the Baconian methodology. His own words in "Mellonta Tauta" better explain his point of view :

> "...for hundred of years so great was the infatuation about Hog (Bacon) especially, that a virtual end was put to all thinking, properly so called. No man dared utter a truth to which he felt himself indebted to his Soul alone. It mattered not whether the truth was even demonstrably a truth, for the bullet-headed savants of the time regarded only the road by which he had attained it. They would not even look at the end.'Let us see the means', they cried, 'the means !'. If, upon investigation of the means, it was found to come under neither the category Aries (that is to say Ram) nor under the category Hog, why then the savants went no farther, but pronounced the 'theorist' a fool, and would have nothing to do with him or his truth".(

This fits quite neatly with Daniels' opinion :

> "The Baconian philosophy has become synonymous with the true philosophy... it was not merely that Francis Bacon's philosophy was the most adequate or the most useful, but it was thought to be true, and any other philosophy was correspondingly false". (5)

> "...Anything that could not be placed in the framework of induction by simple enumeration was called 'hypothesis' a popular word of disapprobation at that time". (6)

Baconianism, as I have already stated, restricted itself to the analysis of observable facts only. More abstract problems were considered

to be outside the domain of science. For Poe, this factor constituted the most unpardonable one; it repressed the imagination. He thought that Baconians blinded themselves by too many details and by keeping the object of their analysis too close to their eyes. In the tale called "The Sphinx" Poe satirizes Baconianism by showing that an insect can resemble a monster when placed just in front of our sight. Bacon's theory, as we have just noted, was based on facts which could be physically observed. In this tale Poe demonstrates that the theory is not consistent for we cannot always trust our senses.

Throughout his career Poe was interested in trickery, In "Diddling Considered as One of the Exact Sciences" Poe gives many examples of good diddles; that is, ways to cheat people. He narrates the success of clever fellows in preying upon the unsuspecting. In "Maelzel's Chess Player" he shows another way the eyes can be deceived by a clever manipulator of objects like Maelzel. The "automatic machine" always won against live partners. With the display of the extremely detailed mechanism of the machine, Maelzel deceived the public's eyes. The audiences were so convinced of it being a real machine that they did not question the possibility of there being a man hidden inside it. This was Poe's first tale of ratiocination. In "The Man that Was Used Up" the narrator spends the whole tale trying to solve the mystery regarding General Smith. Only in the end of the story is the secret revealed. General Smith pretended to be a normal man before people but he was not. He had been used up (mutilated) by the Bugaboo and Kickapoo Indians who made him a bundle. Science had made him a kind of robot. Every part of his body was attached to him by means of screws. He was a general made up of cork legs and arms, false teeth, and other artifical limbs such as shoulders, bosom, eyes and even palate. This tendency to hoaxing is also expressed in the balloon stories which will be analyzed in the next section. Poe seemed to feel a certain pleasure in cheating people or making them appear blind to very evident facts. This scorn for the mob is very characteristic of him. He became interested in the solution of cryptograms early in 1840. While an editor at Graham's he asserted that no cryptogram could be sent

to that paper, which he would not be able to resolve. He felt immensely happy to accomplish what most people were not able to do. The earliest symptom of this is in the mysterious hieroglyphs in Pym (1838). The principal result of his interest in cryptography was to lead him to the writing of "The Gold Bug". In this tale, facts alone and logical analysis drove him to unfold the cryptograph and find out the hidden treasure. These kinds of riddles whose solution was not evident to the eyes of the public fascinated our author. Thus, unlike Baconians, Poe did not believe that one could always trust his senses. He could not see how Baconians put faith in "axioms" as immutable bases of truth.

Poe did not complain of Baconians so much because of their baseless logic, but mainly because of their stubborn blindness to see any other way to knowledge than the two discussed here (induction and deduction). Baconianism confined the soul but Poe could not prevent his own from soaring. He could not confine his imagination. He does not seem to have taken the Baconian defeatist attitude. On the other hand, he was very interested in facts, but he was more deeply interested in what lay beyond facts. Because of his desire to transcend, abstract subjects such as magnetism and mesmerism fascinated him.

In several of his stories Poe's buried subject is really the search for the kind of mind that was coherent in a Baconian sense. But he was also capable of perceiving truths that an orthodox Baconian could never reach. The tales that display this search most prominently are the detective stories : "The Murders in the Rue Morgue", "The Mystery of Marie Roget", and "The Purloined Letter". In these stories Poe introduces the detective Monsieur C. August Dupin who lives a retired life among his books. Dupin is seldom conscious of human society at all, so involved is he in his own peculiar investigations and mental life. However, when he does involve himself in society it is to satisfy a whim, or to solve a problem that no one has been able to solve. Above all he is aware, he is conscious, and it is his greater consciousness that allows him to see what others do not see. In Dupin Poe expressed an aspect of his own personality he had only expressed briefly in Pym and "The Gold Bug"; his fascination

for fact and logical analysis. The concepts of analytical ability expressed in the beginning of "The Murders in the Rue Morgue", I feel are important to define, as Poe appeared to think :

> "As the strong man exults in his physical ability delighting in such exercises as call his muscles into action, so glories the analyst in that moral activity which disentangles. He derives pleasure from even the most trivial occupations bringing his talent into play. He is fond of enigmas, of conundrums, hieroglyphics, exhibiting in his solutions of each a degree of acumen which appears to the ordinary apprehension praeternatural. His results, brought about by the very soul and essence of method, have in truth, the whole air of intuition."(7

Dupin, however, is not just a man of great rational power. Poe was too much of a poet to allow any of his heroes to be completely rational. Dupin has the mind of a mathematician and the soul of a poet. It is this unusual combination of qualities that makes him such a fascinating character. On the one hand is his analytical reasoning in observing the facts and in listing the separate elements of the crime that are unusual. On the other hand, his imagination comes into play in the construction of the theory of the crime. Thus, based on facts alone his logic helps him to unfold the riddle and his imagination enables him to draw conclusions from these facts. Dupin's commitment to observation of individual facts to arrive at a general conclusion brings Baconianism back to our mind. It was by Baconian induction that Poe's detective solved the mysteries. Here lies the reason why the mastermind (Dupin) always outwits the innefficient authority (the prefect of police) who searched for the truth in a too profound manner and blinded himself by unnecessary details. Dupin, instead, was able to reconstruct the crime simply as an intellectual and intuitive exercise. This suits his character better than rooting around for a multitude of facts. In the three stories in which he appears, Dupin elaborates a theory of the importance of the seemingly irrelevant, and has trained his mind to catch the importance of small details. In "The Purloined Letter", he tells the narrator that the secret of his success was neither luck nor profound analysis, but the ability to identify with his opponent's intellect so that he could correctly reconstruct

the course of action involved in the crime.

In all three of his detective stories then, Poe elaborates the idea that the imagination of a poet, as well as the analytical ability of a scientist are needed to solve mysteries successfully. This seems to have been Poe's own position regarding his approach to scientific matters. He was a poet and he also had logic and analytical reasoning which accounted for his interest in science. It seems, however, that the poet was never at rest in Poe for he let his imagination work on his fiction. Thus, one could say that he many times treats rational subjects in a poetical or philosophical way. He was half-poet, half-scientist. That is why one can call him a "non-scientific scientist". Like Dupin, Poe was not completely rational. Again, like his detective Poe seems not to have gone deep in his scientific inquiries. Both of them, therefore, shared this last affinity which was also a Baconian trait : they were not fond of profound analysis. As we shall see when we examine his works, Poe's scientific understanding appears to be somewhat superficial only in the stories related to exact or practical applied science. In the tales concerning speculative and philosophical science he lets his imagination go farther. It is in this last respect, as we have seen above, that Poe deviates from the Baconian framework.

Poe's imagination accounts for his interest in abstract scientific matters such as Magnetism, Galvanism and Mesmerism, which led him to write philosophical and speculative science. His analytic mind, on the other hand, is responsible for his stories in exact or practical applied science; that is, tales related to scientific inventions, physics, chemistry, geography, astronomy, zoology, botany, alchemy, phrenology, cryptography and hieroglyphics. The short-stories related to these issues will be analyzed in the following chapter. We shall note that some of these subjects lead to transcendence. The tales of philosophical speculations will be treated in a separate chapter for they describe the other side of Poe's scientific mind. In the next section I also intend to show that science was one of Poe's sources of energy and inspiration, although he confessed to be depressed by it. For him science was a way to reach transcendence or God. This line of thought will be followed throughout the whole dissertation.

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5. Exact and Practical Applied Science.

In "The Thousand-and-Second Tale of Scheherazade" Poe gives us enough evidence that he certainly had some scientific knowledge. How well founded was his scientific understanding we shall consider later. It may suffice for now to focus the range of his scientific inquiries.

Like in the "Arabian Nights" Scheherazade tells a long tale; but here it lasts one-thousand-and-two nights. In the story there are descriptions of fantastic places visited by Sinbad on the back of a sea monster. He talks about phenomena which are apparently incredible. Nevertheless, Poe proves in his footnotes that truth is sometimes stranger than fiction. He demonstrates that such things exist , as, for instance, a petrified forest (a geological phenomenon) :

> "One of the most remarkable natural curiosities in Texas is a petrified forest, near the head of Pasigno river. It consists of several hundred trees, in an erect position, all turned to stone. Some trees, now growing, are partly petrified. This is a startling fact for natural philosophers, and must cause them to modify the existing theory of petrification."- Kennedy.
>
> "There is scarcely, perhaps, a spectacle on the surface of the globe more remarkable, either in a geological or picturesque point of view than that presented by the petrified forest, near Cairo..." - Asiatic Magazine. (1) *

Poe presents a plausible argument to prove (in his footnotes) each of the spectacular things described in the tale. To explain an abyss which "issued so vast a quantity of ashes that the sun was entirely blotted out from the heavens, and it became darker than the darkest night..." (2), he places a note which indicates his interest in Geography :

> "During the eruption of Hecla, in 1766, clouds of this kind produced such a degree of darkness that, at Glaumba, which is more than fifty leagues from the mountains, people could only find their way by groping..." - Murray, p. 215, Phil. edit. (3)

In respect to a district with vegetables that grew not upon the soil

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* In Pym Poe also comments on the geological constitution of the chasms in Tsalal Island as being formed of black granite, soapstone and marl.

but in the air Poe argues that the botanical specimen, "The Epidendron, Flos Aeris, of the family of the Orchidae, grows with merely the surface of its roots attached to a tree or other object, from which it derives no nutriment-subsisting altogether upon the air." (4) Another quote shows Poe's awareness of a new specimen added to the zoological class of insects :

> "The Hottle; a decided caterpillar, or worm, is found growing at the foot of the Rata tree, with a plant growing out of his head. This most peculiar and most extraordinary insect travels up both the Rata and Perriri trees, and entering into the top, eats its way, perforating the trunk of the tree until it reaches the root, it then comes out of the root, and dies, or remains dormant, and the plant propagates out of its head..."(5) *

On account of Sinbad's reference to man-animals of a nation of the most powerful magicians who lived with worms in their brains Poe says that "the Entozoa, or intestinal worms, have repeatedly been observed in the muscles, and in the cerebral substance" - See Wyatt's Physiology, p. 143. (6)

Chemistry is another field Poe exploits in this tale where a magician made ice in a red-hot furnace. Poe discusses how this chemical process can be developed. Due to the difficulty of shortening the description of this process I must quote the passage in full :

> "Place a platina crucible over a spirit lamp, and keep it at red heat; pour in some sulphuric acid, which, though the most volatile of bodies at a common temperature, will be found to become completely fixed in a hot crucible, and not a drop evaporates - being surrounded by an atmosphere of its own, it does not, in fact, touch the sides. A few drops of water are now introduced, when the acid, immediately coming in contact with the heated sides of the crucible, flies off in sulphurous acid vapor, and so rapid is its progress, that the caloric of the water passes off with it, which falls a lump of ice to the bottom; by taking advantage of the moment before it is allowed to remelt, it may be turned out a lump of ice from a red-hot vessel."(7)

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* Earlier in Pym Poe had given detailed descriptions of the constitution and behavior of animals such as penguins, elephant-tortoises, the albatross, the biche de mer, fish and birds; which also prove his readings in zoology.

Explaining the fact that in one of the strange nations visited by Sinbad, people in general and animals did not have any difficulty in seeing objects which did not exist at all (or that had ceased to exist twenty millions of years before), Poe displays what he may have learned from his readings in physics :

> "Although light travels 167,000 miles in a second, the distance of 61 Cygny (the only star whose distance is ascertained) is so inconceivably great that its rays would require more than ten years to reach the earth. For stars beyond this, 20 or even 1000 years - would be a moderate estimate. Thus, if they had been annihilated 20, or 1000 years ago, we might still see them today, by the light which started from their surfaces 20, or 1000 years in the past time. That many which we see daily are really extinct is not impossible - not even improbable."(8)

What seems very important in this tale is that one can observe, by the source of Poe's footnotes, that he was used to reading scientific books, magazines, and newspapers. Besides Wyatt's Physiology and the Asiatic Magazine just mentioned, he quoted from Rev. P. Keith - System of Physiological Botany. In "The Premature Burial" Poe mentions the Chirurgical Journal of Leipsic. We also learn from his story "Von Kempelen and His Discovery", that Poe was acquainted with Silliman's Journal, which, as has been remarked in section 2., was the most important scientific journal of the time. "The Thousand-and-Second Tale of Scheherazade" becomes significant not only because it consists of a good example to show Poe's fascination with science. It is also relevant because it somewhat indicates the way he used science. Here it is clear that science was a source of inspiration for Poe; from it he extracted strange ideas for his fantasies. In the narrative of the tale Poe - the poet is present. His other half, the scientist, is responsible for the scientific character of information in the footnotes. Because he deals with so many different branches of science, we get the feeling that he could not have a deep understanding of all of them. It is as if he were trying to embrace all these topics as a way to show that he was aware of what was going on in the world. It is in this respect that he resembles the amateur scientist, as I have stated before. The footnotes, doubtless, prove his readings on scientific matters, but his quotations imply that he borrowed the words of real scientific men to give more scientific plausibility to the story.

It can, then, be argued that he wanted to show off by appearing to be erudite. Throughout the detective stories Poe has Dupin use Latin phrases and quotations. Through literary allusion and reference to mathematical and linguistic matters Poe impresses the reader with the breadth of Dupin's intellect; this is a point which I will mention more fully hereafter. Other scientific subjects which he used as inspiration for his fantasies in "Scheherazade" : the electrotype, the voltaic pile, the electro-telegraph, the electro-telegraph printing apparatus, and the influence of the ultra-violet ray.

This attraction toward practical scientific inventions led Poe to write his balloon-voyage tales : "The Unparalleled Adventure of One Hans Pfaal", "The Balloon Hoax" and "Mellonta Tauta". These tales are not only important because of the use of balloons (inventions) but also for the discussion of themes related to exact sciences as physics, chemistry, geography, astronomy, and other sciences.

"The Adventure of Hans Pfaal" is a tale about a balloon journey to the moon. Here Poe shows a keen observation of astronomical matters. The balloon was not made of silk, according to the fashion of the time; it was of cambric muslin which was less expensive. It received three coats of varnish of caoutchouc rubber and was attached to a large and deep basket of wicker work. The inflation was effected by the use of a new gas, a constituent of azote, whose density was much less than that of hydrogen. One notices that Poe also appeared to be informed of the way to equip his hero for such a trip :

> "...a telescope; a barometer, with some important modifications; a thermometer; an electrometer; a compass; a magnetic needle; a seconds watch; a bell; a speaking trumpet, etc., etc., etc.; also a globe of glass, exhausted of air, and carefully closed with a stopper, - not forgetting the condensing apparatus, some unslacked lime, a stick of sealing wax, a copious supply of water, and a large quantity of provisions, such as pemmican, in which much nutriment is contained in comparatively little bulk, I also secured in the car a pair of pigeons and a cat." (9)

The fact of Hans Pfaal taking experimental animals along is an indication that Poe had possibly read or heard of laboratory techniques. He also

knew how blood pressure worked in such high altitudes :

> "...besides pain attending respiration, great uneasiness is experienced about the head and body, often accompanied with bleeding at the nose, and other symptoms of an alarming kind, and growing more and more inconvenient in proportion to the altitude attained." (10)

Poe apparently had read something about John Esten Cooke's single-entity theory of disease. Cooke held that the cause of all human ailments was an accumulation of blood in the veins of the liver and other abdominal viscera. Bleeding, according to his theory, was the treatment which would relieve any pain. This was the means Poe used to have Hans Pfaal relieve his pains; by opening the veins of his arms with the blade of a penknife. In "A Tale of the Ragged Mountains" Bedloe contracted a cold and fever. To relieve his pains provoked by a great concentration of blood in the head, Dr. Templeton resorted to topical bleeding; but this time leeches were applied to Bedloe's temples. This kind of treatment was also applied to one patient in "The Premature Burial".

When approaching the moon, Hans Pfaal awoke one morning and thought the balloon had burst or turned upside down. He felt the sensation of falling back to the earth. The situation had been inverted : the earth was above him and the moon beneath him. This notion is correct, for astronomy has proved that there is a time when the gravitation toward the moon becomes more powerful than that toward the earth. This is the reason why Hans Pfaal thought he was falling. In fact, the feeling is that of descent, but toward the moon itself. In certain respects, Poe's description of the physical appearance of the moon is similar to that which was really ascertained by the first aeronauts who first stepped out on our satelite :

> "...the identures of its surface were defined to my vision with a most striking and altogether unaccountable distinctness. The entire absence of ocean or sea, and indeed of any lake or river, or body of water whatsoever, struck me, at first glance, as the most extraordinary feature in its geological condition." (11)

Although Poe does seem to have a certain scientific understanding,

he commits enormous errors. He has Hans Pfaal confess in the story that he was conscious that arguments existed proving the limit to the atmosphere, beyond which it was impossible to survive. But he disagreed with this notion and believed that even beyond the stratosphere he would meet with a similar atmosphere to that of the surface of the earth. Indeed, Hans Pfaal managed to arrive at the moon in nineteen days. Yet, we know that such a feat as reaching our satellite could not possibly be accomplished in a balloon. There would be no possibility of survival beyond the stratosphere. Carrying this point a bit further, we find out that the accident caused by the explosion at the time of the inflation also seems unbelievable. With the explosion, Hans Pfaal was thrown out of the balloon. He was left dangling at a terrific height by a piece of "slender" cord. He even swooned and remained in that position for a quarter of an hour, when he managed to clutch the rim of the balloon again. This looks completely unconceivable. It is surely Poe's phantasy trying to give more sensationalism to the story. I would also remark that another example of Poe's erring science is that he asserts the presence of volcanoes on the moon. The balloon Hans Pfaal sends back to the earth with his message has such an odd appearance and it looks so unreal that he seems to be describing a toy. It had been manufactured of dirty newspapers, its shape

> "Being little or nothing better than a huge fool's cap turned upside down. ...upon nearer inspection, the crowd saw a large tassel depending from its apex, and, around the upper rim or base of the cone, a circle of little instruments, resembling sheep-bells, which kept up a continual tinkling to the tune of Betty Martin. But still worse. - Suspended by blue ribbons to the end of this fantastic machine, there hung, by way of car, an enormous drab beaver hat, with a brim superlatively broad, and a hemispherical crown with a black band and a silver buckle." (12)

It would be interesting now to compare Poe's scientific description of Hans Pfaal's balloon and implements (as we have shown in page 57)with the balloon described above. The latter is truly a product of the poet's imagination. The occupant of this toy-like balloon, a lunarian, is also depicted in such an exaggerated manner that the image of a clown comes to

our minds :

> "This was in truth a very singular somebody. He could not have been more than two feet in height;... The body of the little man was more than proportionally broad, giving to his entire figure a rotundity highly absurd... His hands were enormously large. His hair was gray, and collected into a queue behind. His nose was prodigiously long, crooked, and inflammatory;... This odd little gentleman was dressed in a loose surtout of sky-blue satin, with tight breeches to match, fastened with silver buckles at the knees. His vest was of some bright yellow material; a white taffety cap was set jauntily on one side of his head; and to complete his equipment, a blood-red silk handkerchief enveloped his throat, and fell down in a dainty manner, upon his bosom, in a fantastic bow--knot of super-eminent dimensions." (13)

We again notice Poe's tendency to combine science with phantasy. For purpose of comparison, it is worth placing here two quotes in parallel, to demonstrate Poe's duality as a scientist and as a poet. The difference in the tone of the two narratives strikes us :

> "The moon's actual distance from the earth was the first thing to be attended to. Now, the means or average interval between the centres of the two planets is 59.9643 of the earth's equatorial radii; or only about 237,000 miles. I say the means or average interval; but it must be borne in mind that the form of the moon's orbit being an ellipse of eccentricity amounting to no less than 0.05484 of the major semi-axis of the ellipses itself, and the earth's centre being situated in its focus, if I could, in any manner, contrive to meet the moon in its perigee, the above mentioned distance would be materially diminished."(14)

> "Fancy revelled in the wild and dreamy regions of the moon. Imagination, feeling herself for once unschackled, roamed at will among the ever changing wonders of a shadowy and unstable land. Now there were hoary and time honored forests, and craggy precipices, and waterfalls tumbling with a loud noise into abysses without a bottom. Then I came suddenly into still noonday solitudes, where no wind of heaven ever intruded, and where vast meadows of poppies, and slender, lily--looking flowers spread themselves out a weary distance, all silent and motionless forever." (15)

Poe's note at the end of "Hans Pfaal" is remarkable for he himself calls his tale a hoax. This could be taken as a clue that Poe himself, early in his career (1835), was not confident enough of his

scientific knowledge to present it as true. It should be noted that the departure of the balloon was on a first of April. Also in the note he defends himself from the charge of having copied his story from Mr. Locke's "Moon Story"; though he agrees that both stories have the character of hoaxes and "both attempt to give plausibility by scientific detail." (16) Thus Poe himself admits that his science was partly borrowed and applied purposefully. He tried to give verisimilitude to his stories by the application of scientific principles. Continuing his comments on Locke's "Moon Story" Poe states :

> "That the public were misled, even for an instant, merely proves the gross ignorance which is so generally prevalent upon subjects of an astronomical nature." (17)

Is it not possible that this might be Poe's own strategy too ? The above comments lead us to believe so. Taking into consideration his own statement that he wrote deliberately, we are led to believe that he was a very smart writer who was not very worried about being totally consistent in his scientific stories. One has at least reasonable grounds for believing that perhaps he also took advantage of the public ignorance regarding science.

"The Balloon Hoax" does not contain as many exaggerated phantasies as "Hans Pfaal". This is possibly due to Poe's maturity, for nine years had elapsed since he had written his first balloon story. "The Balloon Hoax" is a tale about a balloon "Victoria" which crossed the Atlantic in three days, with eight aeronauts in it. Their original design had been to cross the British Channel, but an accident with the steel rod made them change their direction. This time the balloon was composed of silk instead of cambric muslin. Again it was varnished with the liquid gum caoutchouc, although coal gas was used in the place of hydrogen. Poe introduced in this story Mr. Green's invention--the guide rope--, which is also present in "Mellonta Tauta". It was a very long rope which hung from the car. It prevented the balloon from changing its level, pointed out its direction and velocity :

> "If, for example, there should be a deposition of moisture upon the silk, and the machine begins to descend in consequence, there will be no necessity for discharging ballast to remedy the increase of weight, for it is remedied, or counteracted, in an exactly just proportion, by the deposit on the ground of just so much of the end of the rope as is necessary. If, on the other hand, any circumstances should cause undue levity, and consequent ascent, this levity is immediately counteracted by the additional weight of rope upraised from the earth." (18)

The guide-rope was really used for such purposes according to the Encyclopaedia Britannica. As a matter of fact, the "drag-rope" was invented by the Englishman Charles Green (1785-1870). Mr. Green was also the first to ascend in a balloon inflated with coal-gas. Coal-gas was much heavier than hydrogen, but it was cheaper and more easily available at that time. In 1836, Green, Robert Hollond and Monck Mason flew in the "Vauxhall" balloon, later called the "Great Nassau", from London to Weilburg, in the duchy of Nassau, Germany, It is worth noting that Poe placed a Mr. Monck Mason and a Robert Holland among the eight aeronauts of "The Balloon Hoax"; he also mentioned the "Nassau" voyage. This is indicative that he had, without any doubt, heard about these real aeronauts. Like in "Hans Pfaal", in "The Balloon Hoax" Poe analyzes the problem of concavity and then convexity of the earth when seen from the balloon. He says that at about 25,000 feet of elevation the globe appeared concave. Only at a much superior altitude did it begin to look convex.

Poe says in the beginning of the story that the narrative of the voyage was copied from the diaries of two of the aeronauts : Mr Monck Mason and Mr. Harrison Ainsworth. If we pay attention to their descriptions we realize that Mason is always more direct in his narrative, and gives more technical information about the flight :

> "Just before day we were all somewhat alarmed at some odd noises and concussions in the balloon, accompanied with the apparent rapid subsidence of the whole machine. These phenomena were occasioned by the expansion of the gas, through increase of heat in the atmosphere, and in consequence disruption of the minute particles of ice with which the network had become encrusted during the night." (19)

Mr. Ainsworth, however, lets phantasy shape his narrative sometimes. Giving himself entirely to imagination he writes :

> "The waters give up no voice to heavens. The immense flaming ocean writhes and is tortured uncomplainingly. The mountainous surges suggest the idea of innumerable dumb gigantic fiends struggling in impotent agony. In a night such as this to me, a man lives-lives a whole century of ordinary life-nor would I forego this rapturous delight, for that of a whole century of ordinary existence." (20)

Once more one apprehends Poe's duality as a scientist and as a poet. His imagination never let his analytic mind predominate. Moreover, I feel that this story is too optimistic in comparison with "Hans Pfaal". Here the aeronauts did not have any problem at all. They experienced neither intense cold, nor headache, nor difficulty of breathing as would be normal in a balloon flight. This makes the story still more unreal. It took them seventy-five hours to cross the Atlantic from shore to shore. They landed at Fort Moultrie (Sullivan's Island). Even there the conditions were "made to order" for their landing, "the tide being out and sand hard, smooth, and admirably adapted for a descent." (21)

Poe published what is now known as "The Balloon Hoax", as a matter of fact in the New York Sun. As the title itself says, Poe considered the tale a hoax. Although the whole account was presented in an intelligent form, as true news and trying to convince, he called it a fake. This might be justified on the grounds that perhaps deep within himself Poe thought that such an event would not deceive all the readers. It was, probably, too fantastic an enterprise for that early time. He again tried to be plausible by shaping the tale with a certain scientific complexity for,as he asserts,

> "so resolute is the world to despise anything which carries with it an air of simplicity. To accomplish the great desideratum of aerial navigation, it was very generally supposed that some exceedingly complicated application must be made of some unusually profound principle in dynamics." (22)

It was Poe's passion for accuracy which made him give to every detail the illusion of reality. But what makes "The Balloon Hoax" still more

incredible is that even today, when so much progress has been accomplished by science and technology, the oceans remain unconquered by a balloon. Even a 1977 attempt to cross the Atlantic in a balloon, a few months ago, was not successful. Yet, in Poe's tale, this great feat was achieved.

"Mellonta Tauta" is written in the form of a letter and narrates a balloon-voyage "on board Balloon Skylark", under the disguise of being written in the first of April 2848. Its philosophical implications have already been treated. The tone of this story is somewhat different from the two others. In the beginning the narrator talks about the journey as tedious and odious:

> "Heigho ! When will any Invention visit the human pericranium ? Are we forever to be doomed to the thousand inconveniences of the balloon ? Will nobody contrive a more expeditious mode of progress ? The jog-trot movement, to my thinking, is little less than positive torture." (23)

He complains mainly of the low speed which provoked ennui. Somewhere later in the story he contradicts himself entirely when he comments :

> "How very safe, commodious, manageable, and in every respect convenient are our modern balloons ! Here is an immense one approaching us at the rate of at least a hundred and fifty miles an hour. It seems to be crowded with people - perhaps there are three or four hundred passengers - and yet it soars to an elevation of nearly a mile, looking down upon poor us with sovereign contempt. (24)

As he promised in the beginning of the letter, he managed to be as incoherent and as unsatisfactory as possible. The above comments certainly prove that Poe could not always make consistent scientific predictions. He wanted to satirize all nineteenth century scientific thinking but he was not very advanced himself. He could not think of any other means of aerial navigation in the year 2848, than a balloon. A more sophisticated means such as a rocket did not strike his mind. The idea of three or four hundred people crowded in a balloon aggravates still more his lack of vision. The narrator proceeds by stating that (in 2848) one hundred or even two hundred miles an hour was considered slow travelling. He talks about a train in the "Kanadaw" continent that ran three hundred miles the hour. At the same time, however, he seems to

prefer slower trains. Describing his feelings during his flight across Canada he notes :

> "That was travelling. Nothing to be seen though - ... Everything seemed unique - in one mass. For my part, I cannot say but that I preferred the travelling by the slow train of a hundred miles the hour. Here we are permitted to have glass windows - even to have them open - and something like a distinct view of the country was attainable." (25)

Poe's scorn for progress, which also appears in other tales becomes apparent here. He goes on comparing ancient railroad tracks (those of the nineteenth century) which were generally double, with the rails of his time (2848), which consisted of twelve paths, three or four new ones being in preparation. He then satirizes the nineteenth century "ancient people" for their ingenuousness in believing that there was merely a centre of gravity common to all revolving orbs. He found it incomprehensible how they did not see,

> "the true state of affairs - that of the binary revolution of our sun and Alpha Lyrae around a common centre of gravity ! (26)

Like in "Hans Pfaal", in "Mellonta Tauta" Poe presents the moon as being inhabited. In the former story the lunarians are characterized by the ugliness of their physical construction and for their ignorance of the use and properties of speech. In the latter, he depicts the lunarians as having achieved a more advanced civilization than the inhabitants of the earth. We might briefly consider that in this respect Poe contradicts himself again. If the moon lacked necessary conditions for life, such as the existence of water, how could it be inhabited ? Nevertheless, I may as well take this occasion to remark that although Poe has been charged with prying into science, one must admit the fact that his interest and speculations about it, were, at least half a century in advance of his time. In other words, Poe was one of the first men of letters to really have his imagination excited by science. In "Mellonta Tauta" he foresaw the skyscraper and predicted the trans--oceanic telegraph as well as our modern railroads. These are some important deductions about the future which were in many respects

prophetic and show Poe's use of science.

It is the space research theme which places "The Conversation of Eiros and Charmion" among the balloon stories, and makes clear the connection between Poe's science and Poe's fiction. However, its philosophical implications will be accounted for in the next chapter. This tale tells the story of two lovers who met in the next world (Aidenn) after death. Eiros tells Charmion, who had died before, how the earth had been destroyed by a comet. He explains that speculations on astronomy had been at fault at that time. Astronomers had arrived at the conclusion that comets were divested of flames; as a consequence an eventual contact of a comet with the earth was never feared. When the appearance of a new comet was announced, some astronomers calculated that it would come into very close proximity with the earth; others maintained that a contact was inevitable. While the strange orb was approaching, the opinions about the consequences diverged :

> "What minor evils might arise from the contact were points of elaborate question. The learned spoke of slight geological disturbances, of probable alterations in climate and consequently in vegetation; of possible magnetic and electric influences. Many held that no visible or perceptible effect would in any manner be produced. While such discussions were going on, their subject gradually approached, growing larger in apparent diameter, and of a more brilliant lustre. Mankind grew paler as it came. All human operations were suspended." (27)

As the comet was attaining a size never recorded before, people did not believe the astronomers any more and waited for the evil. They were sure that they were already under the influence of the comet. At first men could breath more freely and felt an unusual vivacity of mind. Even vegetation grew more luxuriant. But they eventually began to feel pain in the breast and lungs, and a dryness of the skin. By the agency of Eiros Poe explains that these physical disturbances were provoked by the comet's influence upon the action of oxygen and nitrogen gases surrounding the earth :

> "It had been long known that the air which encircled us was a compound of oxygen and nitrogen gases, in proportion of twenty-one measures of oxygen and seventy-nine of nitrogen, in every one hundred of the

> atmosphere. Oxygen, which was the principle of combustion, and the vehicle of heat, was absolutely necessary to the support of animal life, and was the most powerful and energetic agent in nature. Nitrogen, on the contrary, was incapable of supporting either animal life or flame. An unnatural excess of oxygen would result, it had been ascertained, in just an elevation of the animal spirits as we had latterly experienced.It was the pursuit of the extension of the idea, which had engendered awe. What would be the result of a total extraction of nitrogen ? A combustion irresistible, all devouring, omni-prevalent, immediate;..." (28)

Therefore Poe explained that the excess of oxygen was responsible for their first pleasant sensations relating to breathing and mental vivacity. The pains began when there had been a considerable extraction of nitrogen. Finally, when the nucleus of the comet involved the earth, no nitrogen was left. Thus the mass of ether which surrounds the earth burst into intense flame and ended all. The biblical prophecy that the final destruction of the earth would be by fire had been accomplished.

Poe appeared to be well informed about comets. But for the present purpose it is only important to note that, according to basic chemistry, comets are indeed constituted of flames and would certainly destroy our globe if a contact ensued. He was also completely right concerning the role of the two gases in such circumstances. The percentage of 21 % measures of oxygen is exact. However, Poe is mistaken when he says that the measure of nitrogen is 79 %. The exact percentage of nitrogen is 78 %. The remaining 1% is made up of other gases such as: hydrogen, helium, neon, carbon dioxide, argon, xenon, and neptunium. Of course this is not a very serious mistake. From the nineteenth century point of view Poe was well-informed in this respect. Perhaps the presence of these other gases had not been discovered yet. A probable local source for "Eiros and Charmion" was the rain of meteors which was visible in Baltimore in the early morning of November 13, 1833. There is a certain reality in Poe's description due, possibly, to his observation of the feelings of the people in Baltimore at that time. They probably thought that the end of the world was at hand. In a word, the intense light of the sky, the dread on the part of the people, might have suggested to our author the description of the comet which brought

destruction to the world. It is also likely that Poe saw Halley's Comet in 1835.

Astronomy and Geography are also discussed in "Three Sundays in a Week". A young man was trying to get his uncle's consent to marry the girl he loved. The old man told his nephew that he would only obtain his permission when three Sundays came together in a week. The strategy the young man used to convince his old uncle involves an explanation of the movements of the earth and indicates that Poe knew something about this branch of Geography. The whole plan was worked out by Captain Smitherton and Captain Pratt, two sailors who were friends of the family, and had just arrived from a long trip; one had gone east, the other west of London. A summary of Captain Smitherton's narrative may prove of some interest. Based on the fact that the earth completes each turn upon its axis in twenty-four hours, Smitherton explained that having gone twenty--four thousand miles east, he had anticipated the rising of the London sun by a day. Captain Pratt, on the contrary, had sailed twenty-four thousand miles west. He was one day behind the time at London. Thus, with Smitherton the day before had been Sunday, with old uncle, that very day was Sunday, and with Pratt, the next day would be Sunday. As it was proved scientifically that three Sundays had come together in a week, old uncle gave his consent to the marriage. Again, science was the source of Poe's inspiration to make up a story.

As I have briefly pointed out, Poe dealt with the theme of gravity in his stories of space exploration. This subject is once more slightly touched in "MS. Found in a Bottle", and "A Descent into the Maelstrom". In "MS. Found in a Bottle" two ships are swallowed by a whirlpool during a hurricane. Poe does not use the term "gravity", but its force is implied, pulling the ship down toward the South Pole :

> "Oh, horror upon horror ! The ice opens suddenly to the right, and to the left, and we are whirling, dizzly, in immense concentric circles, round and round the borders of a gigantic amphitheatre, the summit of whose walls is lost in the darkness and distance... - we are plunging madly within the grasp of the whirlpool - and amid a

> roaring, and bellowing, and thundering of ocean and tempest, the ship is quivering - Oh God ! and going down." (29)

The idea of an abyss or whirlpool pulling things down toward the South Pole reminds us of John Cleves Symmes' theory that maintained the earth to be hollow and open at the poles; that is, with access to the interior through great holes at either pole. Symmes died in 1829, and it seems very likely that Poe was influenced by his ideas to write this passage. In "A Descent into the Maelstrom" a fisherman manages to escape the great whirlpool of the Maelstrom (Norwegian coast). The narrator curiously observes that heavy objects and spherically shaped objects slid down and disappeared fastest in the watery funnel; and that cylindrical objects were absorbed more slowly. The image of the force of gravity is also given through the description of whirlpools and vortices which pulled the boat downward. Here Poe appears to be referring to Symmes' hole itself when he states that,

> "Kircher and others imagine that in the centre of the channel of the maelstrom is an abyss penetrating the globe, and issuing in some very remote part." (30)

I can find no more suitable place than this for introducing an account of The Narrative of Arthur Gordon Pym . Pym also asserts that they were hurrying on to southward, under the influence of a powerful current. Symmes' theory may have suggested to Poe the conclusion of Pym . The allusion to a hole at the South Pole becames clear again through Pym's words at the very end of the narrative :

> "The summit of the cataract was utterly lost in the dimness and distance. Yet we were evidently approaching it with a hideous velocity." (31)

As for Pym I would also remark the scientific details which Poe gives in his description of the few previous voyages which had hitherto been made to the South Pole. In relation to the geography of Antarctica, he even gives the lattitude and longitude of the islands and points out the people who discovered them; showing this way the learning he had borrowed from the history of South Polar exploration. For his background he

had drawn upon Benjamin Morrell's Narrative of Four Voyages to the South Seas and the Pacific (1822-1831). It appears that Poe had read a great deal about the sea in travel books and technical treatises on sailing craft*, and the facts he had absorbed enabled him to create an atmosphere of realism in the three last stories discussed above. In Pym Poe describes the magical-looking black water of a river in Tsalal Island. As he also mentions the coast of Brazil and Rio de Janeiro during the narrative, it seems possible that he may have heard of Rio Negro (Black River) which is a tributary of the Amazon River. Poe based "MS. Found in a Bottle", "A Descent into the Maelstrom" and Pym upon a wide, though apparently secondary knowledge of sailing, geography, and physical phenomena in general. In all of these cases Poe uses specific physical phenomena to induce emotions which are limitless.

The series of stories analyzed above are related to sciences which are still considered exact sciences in our own day. Edgar Allan Poe also dealt with subjects which were considered scientific during the nineteenth century but which have been abandoned as true sciences in the twentieth century. Alchemy and Phrenology have been proved to be non-scientific subjects. If Poe had a truly scientific mind perhaps he could have realized, even in his own time, that these matters would be dismissed one day because of their speculative character which separated them from exact sciences.

In "Von Kempelen and His Discovery" alchemy is the subject chosen by Poe. Von Kempelen managed to make gold out of a combination of fused lead and other unknown substances. He effected his counterfeiting operations in the garret of an old house where the police found him :

> "In one corner of the closet was a very small furnace, with a glowing fire in it, and on the fire a kind of duplicate crucible - two crucibles connected by a tube. One of these crucibles was nearlly full of lead in a state of fusion, but not reaching up to the aperture of the tube, which was close to the brim. The other crucible had some liquid in it, which, as the officers entered seemed to be furiously dissipating in vapor." (32)

The gold rush to California (1849) had possibly been the source for the

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* Poe also refers to Captain Cook, Captain Briscoe, and Jeremiah N. Reynolds (projector of the voyages to the South Seas). Later Poe would call loudly for "Reynolds!" before dying.

development of this story.

Phrenology is also not considered a science any more. For a better understanding of the short stories to be analyzed next, a few words in explanation will be here necessary regarding the phrenological theory.

A German physician named Franz Joseph Gall was the originator of the phrenological theory of the brain structure. This doctrine was basically derived from that of Lavater who maintained that the character might be read by the feature of the face (physiognomy) and form of the body. After several years of studies Gall began to lecture in Germany. He converted Johann Gaspar Spurzheim in 1800. Later Spurzheim disagreed with some of his mentor's concepts and departed for England. Both of them, however, are often considered the founders of the new science. In Britain, during a lecture tour in 1814--1815, Spurzheim converted one of his auditors, George Combe, a young Edinburgh lawyer who became the most prominent propagator of phrenology in Britain and later in the whole world.

Phrenology held that the mind was not unitary but composed of independent faculties which they catalogued such as, for example, combativeness, veneration, benevolence, adhesiveness, amativeness and language. Phrenologists believed that these propensities were localized in different organs or regions of the brain. The faculty of language, for instance, was supposed to be located right at the front of the skull. Thus the brain was mapped in thirty-seven different organs. These organs or propensities were thought to affect the size and contour of the cranium. An individual with a large skull and a high and full brow was supposed to have highly developed intellectual capacities. T. M. Parssinen demonstrates, that the mind and its functions could be investigated like any other object of scientific study :

> "The basis of phrenology is the belief that psychological characteristics of an individual are determined by the size and proportion of controlling organs in the brain. ...Furthermore, the size of these organs can be discovered by noting the shape of the skull and, especially, any protuberances, since the cranium corresponds closely to the shape of the brain beneath. Consequently, an individual's character can be discovered from a careful examination of his head." (33)

Therefore, besides being the science of mind, phrenology was also a guide to individual character. The popular and scientific traditions of physiognomy, and the theory of temperaments, helped make phrenology acceptable.

In the early nineteenth century there was little interest in or knowledge of phrenology in America. By the 1820's, however, European books and Americans who had studied abroad began to introduce the new science in America. The works of Gall and Spurzheim became popular and the writings of George Combe and his brother Andrew were well known. Cheap and readily available editions of their works were published by American firms. Lyceums and scientific societies added phrenology to their agendas at the very time when scientific lectures were becoming a form of middle-class,and even working-class, entertainment. An American edition of George Combe's essays appeared in Philadelphia in 1822, where, in the same year was founded the "Central Phrenological Society". Being composed largely of doctors, this society demonstrated its truly scientific concern. Even native books on phrenology began to appear. Moreover, a great event was a tour by Spurzheim himself to America to propagate his science, in 1832. He died there after three months of intense lecturing. In the years 1838-1840 George Combe followed Spurzheim's example and also visited America. He duplicated his master's success. His Philadelphia audience exceeded five hundred people in 1839, one of his auditors probably being Edgar Allan Poe.

In the midst of the "Age of Jackson" the American democratic society demanded a development of more practical applications for Phrenology. They could not accept the pure ideas of "theorists" like Gall, Spurzheim, and Combe as Europeans had accepted them. The American citizen wanted phrenology,

> "to explain each man to himself - his virtues and vices, his potentialities, and limitations, how he could improve himself as well as advise him on vocational guidance, aptitude testing, marriage counseling, and how to judge his fellows". (34)

To many, phrenology was a source of certitude in an age of transition and

uncertainty. Orson Fowler was the chief figure in American practical phrenology during the 1840's and thereafter. He and his brother began to give character readings, by examining heads, at reasonable fees. Phrenology was losing its earlier scientific character to become popularized and vulgarized. As John D. Davies says, the Fowlers and their disciples not only managed "to phrenologize America, but to Americanize phrenology." (35)

Gall and Spurzheim developed the physiological doctrines of phrenology. Combe derived from them a social philosophy which would suit the needs of the middle class. It was found out that phrenology could be applied to the reform of educational and penal institutions and insane asylums. At the same time, it soon occurred to the literary men of phrenological societies that they could use phrenology to analyze the characters of literature. Phrenology could be used not only to reform but to explain how men were constituted and how and why they acted. Nineteenth century literature is filled with phrenological interpretations and expressions; and Poe, as we shall see, was influenced as well. Davies remarks that :

> "Sometimes references to it were simply humorous - like Melville's involved discussion of the phrenology of the whale Moby Dick - or metaphoric - as when Thoreau said the American Odd Fellow was distinguished by a lack of intellect and a development of the "organ of gregariousness". Such examples, of course indicate no more than general acquaintance with phrenological ideas and terminology, but at the same time they were means of widening that current." (36)

It was common in many writers of that time to depict the shape of the head as being more important than beauty or dress.

There is no literary evidence of Poe's concern with phrenology before 1836, but in March of that year he reviewed the American edition of Mrs. L. Mile's Phrenology, and the Moral Influence of Phrenology. Poe was an editor of the Southern Literary Messenger then and showed a great enthusiasm for thenew science :

> "Phrenology is no longer to be laughed at. It is no longer to be laughed at by men of common understanding. It has assumed the majesty of a Science, and, as a science ranks among the most important which can engage the attention of thinking beings - This too, whether we consider it merely as an object of speculative inquiry, or as involving consequences of the highest practical magnitude." (37)

According to Davies soon after that Poe was criticizing Robert Wash's Didatics : Social, Literary, and Political, for being hostile to phrenology. A month later Poe's contribution to the Messenger was on poetry. Here again he touched on the topic of phrenology :

> "The phrenologists, he said, had divided mind into basic, primitive faculties, among which was Ideality, 'the sense of the beautiful, of the sublime, of the mystical'. ...poetry was the practical result of this faculty of Ideality". (38)

Edgar Allan Poe uses phrenological terms and concepts in many of his tales. In his three detective stories - "The Murders in The Rue Morgue", "The Mystery of Marie Roget", and "The Purloined Letter", he discusses the phrenological analysis of human faculties. In fact, in "The Murders in The Rue Morgue" Poe even mentions the word "phrenologists" when explaining that analytical power should not be confounded with ingenuity. "The Mystery of Marie Roget" gives Poe place for the discussion of the force of thought and the calculus of probabilities. Finally, in "The Purloined Letter" he comments on the reason educed by mathematical study or analysis. Although he does not use the term "phrenology" in the two last tales, its theory seems to be implied for the subject of his analysis is the exercise of mental abilities. In "Ligeia" Poe describes a woman of very rare learning and intellectual capacity and remarks "The gentle prominence of the regions above the temples." (39). In "The Fall of the House of Usher", Roderick Usher has "an inordinate expansion above the regions of the temple" (40); probably indicating his extraordinary intellectual ability to write such verses as "The Haunted Palace". Poe is a typical nineteenth century writer when he expresses his delight with head bumps and what they could tell of the being beneath them. In these tales, aspects of characterization owe much to Poe's belief in phrenology.

It appears most probable that Poe knew something about the phrenological division of human race into four basic psychological types. Davies describes this division :

> "'the nervous', distinguished by a large brain, delicate health, and emaciation; 'the billious', marked by harsh features and firm muscles; 'the sanguine', characterized by large lung capacity and moderate plumpness; and 'the lymphatic' with rounded form and heavy countenance". (41)

Roderick Usher's "ghastly pallor of the skin... miraculous lustre of the eye... wild gossamer texture of the hair", indicate that he is an example of the "nervous" temperament just described. Bedloe in "A Tale of the Ragged Mountains" has the same characteristics :

> "he was singularly tall and thin... His limbs were exceedingly long and emaciated. His forehead was broad and low. His complexion was absolutely bloodless." (42)

Valdemar is also depicted with an emaciated complexion and lustreless eyes. Most of Poe's characters fit this nervous type. Davies believes Poe himself to belong to this psychological type. Indeed, by what one learns from the biographies of Poe, the description of the nervous temperament ties in with him perfectly. Looking at his work we find other examples of the nervous type in "The Premature Burial", "Loss of Breath", "MS. Found in a Bottle", "A Descent into the Maelstrom", "The Cask of Amontillado", "The Tell-Tale Heart", "Thou Art the Man", "The Black Cat", and "The Imp of the Perverse".

With the exception of the four first stories listed above all the remaining share another characteristic which is worth analyzing. They are all related to "perverseness", or a tendency to do evil. Notwithstanding the fact of this relation, only in "The Imp of the Perverse" does Poe mention this propensity as connected to phrenology. He seems to believe perverseness to be an innate tendency. In this respect he appears to agree with Gall who also admitted the existence of evil propensities in mankind. Spurzheim, otherwise, maintained that mankind was created potentially good. In contrast to Gall's pessimism,

Spurzheim thought that with the aid of phrenology, the perfection of the race could be achieved. Edgar Allan Poe, instead, found that this propensity could not be controlled. To use his own words :

> "I am not more certain that I breathe, than that the assurance of the wrong error of any action is often the one unconquerable force which impels us, and alone impels us to its prosecution." (43)

Also in "The Imp of the Perverse" Poe blames the "phrenologists" for having failed to include perverseness in their division of propensities. By saying this he gives us an evidence that he was not well aware of the ideas of "all phrenologists", although he always uses the term in a general sense. He probably did not know that Combe had classified all persons into three classes :

> "the first... composed of those in whom animal propensities predominate so much over the moral sentiments and intellect, that naturally they are extremely prone to vicious indulgence hurtful to themselves and to society." (44)

The second class included the majority of the population in whom evil propensities and moral sentiments were balanced. In those of the third class, moral sentiments prevailed. It appears, then, that some phrenologists did believe in innate evil tendencies. It just happened that they did not name it "perverseness" but "destructiveness". Thus, Poe could not have said that they did not make room for this sentiment in their classification. The word "perverseness" might indicate that Poe's view of human nature is more complex and sensitive to evil than phrenologists.

Edgar Allan Poe continues "The Imp of the Perverse" by saying that phrenology and metaphysics have followed the a priori or deductive method. For him this constituted their greatest fault. He states that the phrenologists were intellectual and logical men (implying that they were followers of Aristotle's deductive method), rather than understanding and observant men (as are characterized those who follow Bacon's inductive theory). According to his point of view,phrenologists deduced

the systems of the mind by the purposes dictated by God, and not upon the basis of what man usually or occasionally did. He explains that it was the design of God that man should eat. Then phrenologists assigned to man an organ of alimentiveness. And so they deduced all the organs representing propensities, sentiments, and intellectual faculties. Poe remarks that,

> "only induction, a posteriori, would have brought phrenology to admit, as an innate and primitive principle of human action, a paradoxical something, which we may call perverseness, for want of a more characteristic term." (45)

Basically, what Poe seems to be saying here is that a childish and exaggerated faith in God prevented phrenologists from admitting the idea that the Creator had made man evil. By using the term "phrenologists" in a generic sense Poe indicates that he did not know that Gall and Combe had similar ideas to his own regarding man's innate perverseness. Apparently, he had only a general acquaintance with the new pseudo-science; his knowledge about it seemed to be superficial mainly concerning its origin and basic foundations. We also have the feeling that Poe was very restricted for he rejected the phrenological organ of "combativeness" (principle regarding our well being), by hinting that in the case of perverseness no such desire as "to be well" is ever aroused. As we have considered before, he appeared not to believe in the possibility of overcoming evil tendencies. At least this is the impression we get in this tale.

Most phrenologists, on the other hand, believed that phrenology could be applied in the treatment and reformation of insane people and criminals. By following the theories of the brain structure, the defective could be educated and mental disease cured. According to their system criminals and insane people should be treated in a sort of "moral hospital". Phrenology located crime and insanity in the brain and considered them,

> "...a physiological malady, cured by dietetic regimen, treated in hospitals and asylums, soothed into repentance with music, and flowers, and fetes, instead of whip and prisons and gallows." (46)

In his tale named "The System of Doctor Tarr and Prof. Fether" Poe talks about a "Mad House" where a soothing system was applied, which resembles very much the phrenological method of therapy just described. The superintendent of the Maison de Santé explained that in the system of "soothing",

> "all punishments were avoided - that even confinment was seldom resorted to, that the patients, while secretly watched, were left much apparent liberty,..." (47)
> ..."We contradicted no fancies which entered the brains of the mad. On the contrary, we not only indulged but encouraged them; and many of our most permanent cures have been thus effected... We had men, for example, who fancied themselves chickens. The cure was, to insist upon the thing as a fact - to accuse the patient of stupidity in not sufficiently perceiving it to be a fact - and thus to refuse him any other diet for a week than that which properly appertains to a chicken. In this manner a little corn and gravel were made to perform wonders." (48)

Of course here Poe went too far, certainly in order to satirize the method. In the end of the story he shows that this too-liberal system did not work. The lunatics revolted and exchanged places with the keepers of the asylum who were shut up in cells and treated in a very brutal manner. As far as therapy was cornerned then, Poe disagreed with practical phrenologists. Phrenology was used as a tool by both liberals and conservatives. The liberal believed that regeneration could be achieved by training. The conservative, otherwise, held that a criminal or insane person would never be cured. Poe fits the conservative group. As may be plainly seen from what has been stated before Poe, unlike Combe, did not seem to believe in any possible regeneration.

Another aspect of phrenology which Poe touched was that of mens sana in corpore sano. For the pseudo-science, the body as well as the soul should receive careful attention. By the 1840's hydropathy was considered not only a guarantee of good health but as a cure for virtually any disease. The commonest advice was "phrenology, Graham crackers, dress, reform, fresh air, sex hygiene, temperance, the water cure, and sunlight."(49)

Poe's foster mother often recurred to hydropathy. Hervey Allen states that Poe himself spent some time at Saratoga Springs, which is a well known place for the water cure in the United States. (50) Poe implies the use of this kind of treatment in "A Tale of the Ragged Mountains". Bedloe, who suffered of neuralgic attacks also met his physician at Saratoga.

Poe seems to have proceeded with these phrenological implications in his work until the end of his brief career. One of his last works was The Literati of New York City published after his death in 1850. It consisted of a series of sketches of the literary figures of New York. We are informed (in Phrenology: Fad and Science) that embedded in each description of The Literati was a quick cranial topography; in the case of William Cullen Bryant, for example, the forehead is broad, with organs of Ideality. In July, 1849, Whitman had himself phrenologized by Lorenzo Fowler. There is no record of Poe having done the same, but the fact of his having the cranial topography of The Literati done, does not exclude the possibility of he himself having been phrenologized.

Davies argues that the epigraph of Mr. L. Mile's Phrenology and the Moral Influence of Phrenology, which Edgar Allan Poe thought such a contribution to knowledge, was : "it is not necessary to be either a metaphysician or an anatomist in order to understand phrenology." (51) This corroborates the idea that Poe did not want to go into deep and purely scientific thought. What was most attractive to him was that phrenology was easy to comprehend. Phrenology, as we have shown, had a dual appeal. As a science it dealt with the structure and functions of the brain. As a popular movement it was connected with human temperament and behavior. Poe treated phrenology more as a popular movement or social philosophy. In relation to its scientific character (brain structuring) Poe only makes slight refences to phrenological terms and concepts which were fashionable at the time. This factor again proves his somewhat superficial commitment to science.

Early American interest in phrenology was almost exclusively scientific, but because of the popularization and charlatanism of the practical phrenologists, it eventually fell into disrepute. At the beginning of the twentieth century a belief in phrenology stamped a man as unscientific and it ceased to be considered a science at all. In the eyes of phrenologists the mind and the body were not two different orders of existence. By holding that the brain was the organ of mind, or to put it in another way, that "character was the brain", they contradicted the doctrine of the soul's immateriality and its indivisibility. The religious attacks on phrenology destroyed it as a popular movement. Ultimately attacks by physiologists undermined its credibility as a science. They concluded that the scheme of cerebral localization had not been established; there was no necessary connection between the exterior surface of the skull and the brain beneath; the size of an organ was not necessarily related to the development of the function it performed. In short, the entire basis of the system was not considered truly scientific. Finally phrenology decayed because many of its members were led to the study of mesmerism or phreno-mesmerism. We have said that toward the end of the nineteenth century phrenology was charged with being materialistic and mechanistic, consequently reducing the mind to a machine and denying the spiritual world. It eventually gave rise to a preoccupation with mentalism. With the advent of mesmerism, phrenology began to turn toward the occult, spiritualism and transcendentalism.

Throughout his works Poe's characters display an enormous curiosity for things unknown, for the occult. Hidden behind this curiosity was a desire to transcend time and barriers in an attempt to solve the unknown. Pym, for instance, was an attempt to find out what mystery lay beyond the South Pole. Pym was lured by the idea of seeing what no man had ever seen before. Poe sent Pym on a symbolic voyage that goes back in time toward the primal state of the world and ends in nothingness or the barrier to the unknown. As we shall note, it appears that this feeling, related to transcendence, had a strong religious implication, which later is of the

most indispensable importance. In a word, it seems most likely that Poe wanted to transcend human limitations in order to understand God's ideas. This point will become clearer toward the end of this dissertation when we turn to his philosophical speculations. However, even in the tales related to exact or practical applied science which have been analyzed above, one finds indications of this wish to transcend. Poe sought many different ways to transcend. A quotation from "Hans Pfaal" may serve to show that, for this scientific character, a trip to the moon was a way to transcend earthly ties in a search for the unknown :

> "I determined to depart, yet live - to leave the world, yet continue to existence - in short, to drop enigmas, I resolved, let what would ensue, to force a passage, if I could, to the moon." (52)

As we have indicated, Poe lived characteristically obsessed with the possibility of human flight. The manned balloon lived a great deal in his thought, not only as a means to reach the unknown, as also a way to escape from the world in which he lived, which was beginning to be polluted by the progress of industrialism.

In "Mellonta Tauta", "The Balloon Hoax", "MS. Found in a Bottle" and in Pym, Poe has his heroes cork the narrative of their experiences in a bottle and throw them into the sea. The idea of transmitting the message to the world involves an intention of making it eternal. This links with the desire to transcend time. His heroes would probably die but they would leave their contribution to posterity. "Lionizing" demonstrates, in a sense, Poe's presumption to scholarship. In this tale, although in a satirical tone, Poe seems to share the scientists' pride and desire to transcend through eminence in science. In "The Balloon Hoax", by managing to accomplish what nobody else had ever been able to do, Poe might be attempting to prove himself superior. This could be interpreted as another way to transcend. Having deceived many people, (for Poe had put this tale out as true), Poe justified himself of that "scorn for the mob" that many of his other essays and stories exhibited in a remarkable degree, and at the same time praised his self-esteem. For Poe, becoming rich in

"Von Kempelen", and "The Gold Bug" could also be a mode to transcend his present miserable life. The narrator of "MS. Found in a Bottle" disappears into the abyss at the Pole, just as he is on the verge of what he considers to be some fantastic discovery about the unknown world. In "MS. Found in a Bottle", referring to the whirlpool the narrator says :

> "We are surely doomed to hover continually upon the brink of eternity, without taking a final plunge into the abyss." (53)

Similarly, Jonas Ramus in "A Descent into the Maelstrom" journeys into the void. He compares the abyss to "that narrow and tottering bridge which Mussulmen say is the only pathway between Time and Eternity". (54). In both stories therefore, the infinite abyss may be said to symbolize eternity. The desire to explore its depth reinforces the desire to transcend the barrier of time. Looking at it from this point of view, one could say that Poe also used his science in order to produce this state of transcendence.

Poe's scientific characters (emanations of his own character) help us better understand the motives behind his use of science, for the aspirations of his characters were his own. His characters are not really serious in their pursuit of the exact sciences. In these stories dealing with exact sciences and facts, fiction is often combined with fantasy and his scientific characters are mainly fakes or hoaxers, as in the case of "Hans Pfaall", "The Balloon Hoax", "Mellonta Tauta" and "Three Sundays in a Week". Unlike Hawthorne in "The Birthmark" and "Rappaccini's Daughter", Poe does not always directly portray scientists. This only happens in three stories, but these scientists are also hoaxers. The soothing system of "Dr. Tarr and Prof. Fether" is a failure. "Von Kempelen" manages to fake gold and "Maelzel" deceives his audiences through the complicated mechanism of the chess-player machine. In Hawthorne the scientists are possessed by diabolic ideas. They care much more for science than for mankind and are portrayed as violators of human nature. But they are punished for this.

In "Rappaccini's Daughter", for example, Dr. Rappaccini is a scientific gardener who, fascinated by his power infiltrated his daughter's

organism with chemicals which imunized her to the poisonous vegetation in his garden, but made her very touch or breath deadly to anyone else. But he is punished and Beatrice dies, an innocent victm of his diabolic scientific experiments. In "The Birthmark" Aylmer, the idealistic scientist is in search for perfection, and tries to remove a mark from the cheek of his beautiful young wife. She was so beautiful and so perfect that he could not accept this little defect. Though apprehensive, Georgiana submits to his operation, which succeeds. But Hawthorne punishes his scientist for trying "to find the perfect future in the present". His wife's beauty is then perfect but she dies at the moment of his triumph. Thus with this tragic loss Aylmer is punished for his inhumanity and for aspiring to assert man's ultimate control over nature. The very attempt to deny original sin, Hawthorne implies, is itself evil. In Hawthorne's view man is limited and cannot be perfect; man cannot become God-like. Hawthorne's Faustian scientists would sacrifice human life, sometimes their own, for the sake of adding something to their accumulated knowledge. They are men whose intellect is separated from heart. They assume their intellects can transcend natural world, but Hawthorne does not believe this. In his tales scientific illusion remolds man in form of God, but eventually it leads to tragedy. His scientists are destroyed because heart and head are not in harmony. They are Faustian in the bad sense; for them science goes beyond nature and morality-beyond the traditional sense of human limits.

It is very common for an artist to write about some human truth primarily. This is not true in Poe. He is not so concerned about human beings. In fact he is not worried about the moral or psychological consequences which scientific experiments can have for his characters. In Poe's tales the mind is also often separated from matter, but he is not so moralistic and conservative (in short, calvinistic) as Hawthorne. In his stories man can use intellect to transcend earthly conditions and the people who use science are not punished for their attempts to go beyond the natural world through abstraction and analysis. Their prideful flights into abstraction are not punished by a tragic fall back to Earth. The only exception is "MS. Found in a Bottle" where the scientific character

disappears into the void in his attempt to go beyond the unknown. Poe, however, does not make it explicit what he meant by giving such a fate to this character. Whether he was punished or successful in going beyond nature and joining God remains an open question. All these issues would tend to show that Poe despite his fascination with "the power of blackness", is not in the same line with Hawthorne and Melville who are more conservative writers and set human (moral and philosophical) limitations to their characters. Poe is philosophicallly more like Emerson and other transcendentalists who are romantics and believe that spiritual progress is possible. Poe also admits that human mind can go beyond nature - that man can transcend sin and nature through intellect. His scientists are not evil though they may be sometimes charlatans. On the contrary, they are increasingly shown as being God-like, in search for transcendental knowledge.

For Poe the exact sciences,as well as alchemy and phrenology, did not seem to have a deep scientific meaning. For him exact and pseudo-sciences may be said to have constituted a short-cut to metaphysics and the transcendent. Mesmerism and other philosophical and speculative subjects more closely related to transcendentalism will be discussed in the following chapter.

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6. Philosophical and Speculative Science.

To a period that seemed to be rapidly obtaining a certain control over natural forces with an unprecedented velocity, it was to be expected that the supernatural should soon be exploited. In a few years toward the late 1840's the society which had conquered nature by machine, felt now about to solve the mysteries of the intellect and of the spiritual world. As seen in the previous section, with the aid of mesmerism, phrenologists turned in another direction - toward spiritualism and the occult. Without mesmerism, they thought, phrenology was no more than a body without a soul or a brain without life.

In order to understand Poe's stories on mesmerism one must first know something of its ancestry. Franz Anton Mesmer (1734-1815), was an Austrian mystic and physician who invented, in the later part of the eighteenth century, a method of treatment called after him "mesmerism". Mesmer's method was the forerunner of modern hypnosis.

> "His interest in the teachings of Paracelsus caused Mesmer to believe that the stars influence the health and general condition of human beings by way of a subtle and indivisible fluid. He became convinced that there was a healing and magnetic power in his own hands, and in 1775 he first called this force emanating from his body 'animal magnetism', which, he believed, permeated the universe." (1)

Mesmer had striking success especially with hysterical patients, but he believed that his cures were entirely natural phenomena. His popularity continued for several years, but doctors called Mesmer an impostor and a charlatan. Because of his mistaken belief that it was an occult force that emanated through the hypnotist into the subject, he was soon discredited. He eventually retired to private life in Versailles and then Switzerland. He died in 1815 in a village near his native Isnang. Mesmer never realized the psychological and physiological implications of his treatment by animal magnetism. He also could never forsee the range of

the therapeutic benefits to be derived later from suggestion. Mesmerism was used extensively by a number of clinicians. No adequate recognition of its nature, however, was obtained until the middle of the nineteenth century. It was only then that the English physician James Braid studied its phenomena and used the terms "hypnotism" and "hypnosis" for the first time.

In 1836, a Frenchman living in America, Charles Poyen, began lecturing throughout New England on the theories of Anton Mesmer. According to Daniels,

> "Animal Magnetism soon became the fashion, in the principal towns and villages of the Eastern and Middle States. Old men and women, young men and maidens, boys and girls, of all classes and sizes, were engaged in studying the mesmeric phenomena, and mesmerizing or being mesmerized. In the eyes of skeptics it was the experience of phrenology repeating itself." (2)

In 1842, several American magnetizers began to carry on a new experiment. They placed their hands upon the separate mental (phrenological) organs of their patients during the magnetic sleep, inducing these faculties to exhibit their appropriate characteristics. If, for example, the organs of playfulness and good humor were excited, the subject suddenly became happy. A new neologism then appeared - "phrenomagnetism". It was the liason between phrenology and mesmerism.

Orson and Lorenzo Fowler opened the columns of the American Phrenological Journal to these discoveries. Their journal accepted the fact of "clairvoyance" and "Fowlers and Wells" published many books upon spiritualism. La Roy Sunderland became editor of a journal called Magnet (in 1842) to spread the movement. This new publication covered the fields of physiology, physiognomy, phrenology, pathogeny, psychology, magnetism and (later) cephology, pathology, neurology, electricity, galvanism, light, caloric, and life. The Magnet expired after three years of publication. Also in 1842, the "Phreno-Magnetic Society of Cincinnatti" was founded, but it was short-lived too. Its purpose was to study the phenomena of magnetic sleep and induced somnambulism. Mesmerism was, therefore, one of the steps

leading up through the once-forbidden mysteries of nature into the realm of imponderable forces. Baconians had established that the imponderables (unobservable forces such as caloric, light, electricity and magnetism) marked the limit of science. But on enormous curiosity led many scientists to start their researches in these fields.

Edgar Allan Poe must have read and heard about these new discoveries which provoked so much speculation during the time he lived. Hervey Allen remarks in his book Israfel that in 1844 Poe attended a lecture on magnetism given by Andrew Jackson Davies in New York. Allen believes that Poe even paid Davies a visit in search of technical data for his tale "The Facts in the Case of M. Valdemar", and hints that the initial idea for "Eureka" also dates from this encounter (3). It becomes clear, then, that mesmerism, galvanism, clairvoyance, spiritualism and the occult, also troubled Poe's mind and led him to analyze these subjects in some of his short stories.

In "Mesmeric Revelation" Poe narrates the case of a man named Mr. Vankirk who had been declared by his physicians to be suffering from phthisis. The narrator says he was in the habit of mesmerizing Vankirk. One day, however, his patient asked to be mesmerized not only to relieve his physical pains but to satisfy some doubts he had on the soul's immortality. He was skeptical about it and wanted to be subjected to well-directed questions on this subject while mesmerized. In the very beginning of the tale Poe refers to the general laws of mesmerism, which demonstrates that he knew something about it. He defends the mesmeric process, as it can be observed :

> "Whatever doubt may still envelope the rationale of mesmerism, its startling facts are now almost universally admitted. Of these latter, those who doubt, are your mere doubters by profession - an unprofitable and disreputable tribe. There can be no more absolute waste of time than the attempt to prove, at the present day, that man, by mere exercise of will, can so impress his fellow, as to cast him into an abnormal condition, in which the phenomena resemble very closely those

> of death, or at least normal conditions within our cognizance; that, while in this state, the person so impressed employs only with effort, and then feebly, the external organs of sense, yet perceives, with keenly refined perception, and through channels supposed unknown, matters beyond the scope of the physical organs;..." (4)

The colloquy between the operator and Vankirk (while mesmerized) is remarkable because it reinforces Poe's view of immortality and his desire to transcend time. God is the central figure of their dialogue. It becomes evident here that Poe was devoid of traditional religious convictions. Vankirk states that it is impossible to conceive spirit, since it is impossible to imagine what is not. We would only be able to conceive God, if we could imagine a matter much more rare than ether. He says that God is not immaterial since that which is not matter is not at all :

> "He is not spirit, for he exists, nor is he matter as you understand it. But there are gradations of matter of which man knows nothing. The grosser impelling the finer, the finer pervading the grosser. The atmosphere, for example, impels the electric principle, while the electric principle permeates the atmosphere. These gradations of matter increase in rarity or fineness, until we arrive at a matter unparticled - without particles - indivisible-one; and here the law of impulsion and permeation is modified. The ultimate or unparticled matter not only permeates all things, but impells all things; and thus is all things within itself. This matter is God." (5)

Vankirk compares our physical body and soul with the two conditions of the worm and butterfly. According to his opinion our physical body is only a cage to confine our spirit. Death is metamorphosis. The soul then leaves the cage for eternal life, for, as he says,

> "Our present incarnation is progressive, preparatory, temporary. Our future is perfected, ultimate, immortal. The ultimate life is the full design." (6)

During the forties, this kind of preoccupation with the life of the transcendental spirit, above all material and physical demands, had become very common. Poe, as we have remarked also had a deep commitment to this subject. The kind of thing Poe was doing in his stories during

the 1840's was of very great interest. In America, England, and France, the traditional orthodoxies of religion and philosophy were coming to be considered sterile by some of the best intellects of the time. It was in search for new verities or for more convincing reasons to add to their old religious beliefs, that men took to modes of inquiry to fill the void left by their doubts concerning the spiritual world. The bankruptcy of institutional Christianity brought about new prophets and doctrines. Interest in magnetism, mesmerism and spiritualism became intellectually fashionable. Toward the end of his life Poe became more and more anxious to penetrate the world of the soul and transcend time; probably in an attempt to reach the essence of God. His object in inducing Vankirk into a mesmeric trance was to discover, by questioning his subject, the truth of immortality; mesmerism helped him to undertake an imaginative exploration beyond the frontier of conscious knowledge. One may say that mesmerism, as a scientific movement, once more only served as a means for Poe to solve his spiritual inquiries.

In "The Facts in the Case of M. Valdemar" death was arrested by mesmeric process, which again indicates Poe's wish to transcend human limitations and reach immortality. The narrator explains what led him to this new kind of experiment :

> "My attention, for the last three years, had been repeatedly drawn to the subject of Mesmerism; and about nine months ago, it occurred to me, quite suddenly, that in the series of experiments made hitherto, there had been a very remarkable and most unaccountable omission : - no person had as yet been mesmerized in <u>articulo mortis</u>. It remained to be seen, first, whether, in such conditions, there existed in the patient any susceptibility to the magnetic influence; secondly, whether, if any existed, it was impaired or increased by the condition; thirdly, to what extent, or for how long a period, the encroachments of Death might be arrested by the process. There were other points to be ascertained, but these most excited my curiosity - the last in especial, from the immensely important character of its consequences." (7)

M. Ernest Valdemar was a good subject for mesmeric experiment because of his markedly nervous temperament. The operator had already on two or three occasions put him to sleep easily, but the patient's will was

never thoroughly under control. He asserts that nothing could be achieved with Valdemar regarding "clairvoyance". The patient was suffering from pulmonary tuberculosis and consented to be subjected to the experiment of being mesmerized in the moment of dying. Because of the character of his disease the exact time of his death could be calculated. Valdemar received the first passes of the mesmerizing process when he was in the death agony. He was soon in a mesmeric trance and answered a few questions the operator asked him. The pains had disappeared. Suddenly, however, he showed no sign of vitality any more.The operator and the physicians were almost abandoning the patient when his voice reached their ears as if from a vast distance. Valdemar said he was dead. In fact, the mirror no longer afforded evidence of respiration. Nevertheless, there was still indication of mesmeric influence in the vibratory movement of his tongue, whenever Valdemar was adressed a question. He remained in this state for nearly seven months; being daily attended by the physicians. They then decided to start the customary passes that relieve the patient from the mesmeric trance. Valdemar urged them to hurry and put him to sleep or to waken him. The doctors were certain they would be able to see him awaken but when the mesmeric passes were withdrawn the body rotted away before their eyes. By arranging a way to postpone death, Poe might be suggesting that this new experiment, if better developed, could lead to immortality.

In "A Tale of the Ragged Mountains" Mr. Augustus Bedloe suffered from neuralgic attacks and his physician often resorted to mesmerism to relieve Bedloe's physical pains :

> "Dr. Templeton had been a traveller in his younger days, and at Paris had become a convert, in a great measure, to the doctrine of Mesmer. It was altogether by means of magnetic remedies that he had succeeded in alleviating the acute pains of his patient; and this success had very naturally inspired the latter with a certain degree of confidence in the opinions from which the remedies had been educed. The doctor, however, like all enthusiasts, had struggled hard to make a thorough convert of his pupil, and finally so far gained his point as to induce the sufferer to

submit to numerous experiments." (8)

Poe explains that with the repetition of experiments an intense magnetic relation arose between the operator and Bedloe. In this case the will of the patient was entirely under the physician's control. The volition of the operator was obeyed even when Bedloe was unaware of his presence. During one of his excursions to the Ragged Mountains Bedloe had a vision that he was in an eastern-looking city . At first he supposed it to be a dream but then he was sure he had really seen it and even walked and fought among its inhabitants, dying during the combat. When he arrived home Dr. Templeton explained that the battle Bedloe had seen had really happened in the past. At the very moment when Bedloe had fancied those visions in the mountains, Dr. Templeton was writing down that episode upon a paper at home. Dr. Templeton himself and a friend of his had indeed been in that eastern city in the past; and his friend, who resembled Bedloe very much, died during a combat after receiving a poisoned arrow. This was, doubtless, a case of "clairvoyance", although Poe does not use this word here as he does in "Valdemar". This reference to clairvoyance indicates that Poe was interested in the new spiritualistic tendencies of his time.

Although Dr. Templeton does not note the use of the "galvanic battery" among the experiments he tried, the application of this magnetic apparatus seems to be implied, for Bedloe says that when he was in the mountains he suddenly received a shock "as if of a galvanic battery". As Poe uses this kind of battery in other tales, it is interesting to remark something about its origin. Luigi Galvani (1737-1798), Italian physiologist, and an early experimenter in electricity, presented his theory of animal electricity in 1791.

> "In the course of some experiments on frogs he had noticed what appeared to be a correlation between muscle twitching and simultaneous contact with both iron and copper. He proceeded to construct a device of two different metals; one metal he placed in contact with a frog's nerve, the other with a muscle;contraction of the muscle occurred. In Galvani's view the contraction was the result of the unions, by means

> of the mettalic "arc", of the arc's (exterior) negative electrical charge with positive electricity travelling along the nerve from the inner nerve substance (a process named galvanism). He had, of course, produced an electric current."(9)

It was on the basis of these principles that Galvani invented the battery which was named after him. It was often applied to dying patients in an attempt to revive them. It may be argued here that mesmerism and galvanic ressurrection run opposite ways. Indeed, mesmerism drove the patient to a state which resembled death. The battery, otherwise, was applied to restore life to a dying patient. Mesmerism offered the possibility of feeling the supposed sensations of the life beyond. The galvanic battery, instead, was a medium to bring earthly life back. But carrying the point further, one realizes that the most important thing lying behind these two methods, was the study of the boundaries between life and death and the relation of the soul, so far as earthly ties are concerned. This mystery was what most intrigued Poe. In this sense then, one may say that mesmerism and galvanic resurrection are related.

"Some Words with a Mummy" is a tale about the resuscitation of a mummy by means of an electrical shock similar to that of a galvanic battery. Allamistakeo (the mummy) had been 5050 years embalmed. The flesh was in excellent preservation as well as the teeth, hair, and nails. It was then that the physicians, who were going to study it, decided to do an experiment with the "voltaic pile" :

> "The application of electricity to a Mummy,... was an idea, if not very sage, still sufficiently original, and all caught it at once. About one tenth in earnest and nine tenths in jest, we arranged a battery in the Doctor's study, and conveyed thither the Egyptian." (10)

They tried the battery in the temporal muscles but there was no indication of galvanic susceptibility. The doctors were almost giving up the experiment when the mummy moved its eyes. Astonished, they resolved to proceed and managed to revive the mummy. Allamistakeo got down from the table and began to address them in Egyptian. Thus, by the agency of the galvanic battery Poe once more struggles against death; that is, against mortality.

He wanted to be immortal - to transcend time limitations.

Allamistakeo asserts that he was of the blood of the Scarabaeus* and had been embalmed alive. The race of the Scarabaei alone, escaped the general custom in Egypt to deprive a corpse, before embalmment, of its bowels and brains. He also tells the physicians that in ancient Egypt historians were embalmed alive purposefully for a certain time, and then revived. By living in installments they preserved history. Here it is the very idea of embalmment itself that manifests the notion of transcending time. In the end of the story the narrator declares his intention to have himself embalmed :

> "The truth is, I am heartily sick of this life and of the nineteenth century in general. I am convinced that everything is going wrong. Besides, I am anxious to know who will be President in 2045. As soon, therefore, as I shave and swallow a cup of coffee, I shall just step over to Ponnonner's and get embalmed for a couple of hundred years." (11)

Poe also satirizes the nineteenth century movement of progress by showing that the mummy had known all kinds of advancements in its own time. Allamistakeo was acquainted with everything the physicians supposed to be products of the nineteenth century : astronomical knowledge in general, eclipses, burning-glasses and lenses, microscopes, architecture, railroads, artesian wells, steel, steam, dress, and even democracy. Among the questions they asked him, the only things Allamistakeo had never heard of were lozenges and pills. The Egyptians had even been acquainted with methods similar to phrenology and mesmerism as the narrator points out :

> "Having heard us to an end, the Count proceeded to relate a few anecdotes, which rendered it evident that prototypes of Gall and Spurzheim had flourished and faded in Egypt so long ago as to have been nearly forgotten, and that the manoeuvres of Mesmer were really very contemptible tricks when put in collation with the positive miracles of the Thebas savants..." (12)

The mystery of existence, the passage between life and death

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* The Scarabaeus was the insignium, or the arms, of a very distinguished and very rare patrician family.

also appears in "The Premature Burial". In this tale Poe relates several cases of premature internments. In all of them "catalepsy" had been the cause of living inhumation. In a single paragraph one notices Poe's inquiries about the passage to eternity, and also his explanation of the disease named "catalepsy" :

> "The boundaries which divide Life and Death are not at best shadowy and vague. Who shall say where the one ends, and where the other begins ? We know that there are diseases in which occur total cessations of all the apparent functions of vitality, and yet in which these cessations are merely suspensions, properly so called. They are only temporary pauses in the incomprehensible mechanism. A certain period elapses, and some unseen mysterious principle again sets in motion the magic pinions and the wizard wheels. The silver cord was not for ever loosed, nor the golden bowel irreparably broken. But where, meantime was the soul ?" (13)

The immortality of the soul is again questioned like in the case of Valdemar. In one of the cases narrated in this tale, the victim who had been inhumed alive made himself heard and was brought back to life by the application of the galvanic battery to one of the pectoral muscles :

> "A rough gash was made, and a wire hastily brought in contact; when the patient, with a hurried but quite unconvulsive movement, arose from the table, stepped into the middle of the floor, gazed about himself uneasily for a few seconds, and then - spoke." (14)

In another case the victim was unburied, still alive, but then fell into the hands of quacks and died in consequence of an experiment with the galvanic battery.

The theme of the mystical union of life and death recalls to our memory "The Colloquy of Monos and Una". It is a dialogue in the next world. Monos tells Una that his death had been provoked by the general turmoil and decay brought about by civilization. He demonstrates how pollution was destroying nature by stating that :

> "...huge smoking cities arose innumerable. Green leaves shrank before the hot breath of furnaces. The fair face of Nature was deformed as with the ravages of some loathsome disease." (15)

Monos states that ruin had been the price of the highest civilization. But he preferred the sentiment of the natural, of beauty and nature. It seems to me that here, once more, Poe's poetic side defeated his sometimes rational and scientific mind. Longing for the old days when progress had not polluted nature yet, he attacks scientists and defends poets :

> "And these men, the poets, living and perishing amid the scorn of the 'utilitarians'- of rough pedants, who arrogated to themselves a title which could have been properly applied only to the scorned - these men, the poets, ponder piningly, yet not unwisely, upon the ancient days when our wants were not more simple than our enjoyments were keen - days when mirth was a word unknown, so solemnly deep - toned was happiness - holy, august and blissful days, when blue rivers ran undammed, between hills unhewn, into far forest solitudes, primeval, odorous, and unexplored." (16)

Monos believed that man should submit to the guidance of natural laws, rather than attempt their control. But, as the world had been infected by the harms of civilization, he saw no regeneration save in death, or rather, in being"born again" to a new life. He tells Una how had been his own passage through "The Dark Valley of Shadow" to life eternal. Relating his sensations when dying he explains that he was already physically dead and yet was not completely deprived of sentience. He describes this "sixth sense" which had arisen within him :

> "And this - this keen, perfect, self-existing sentiment of duration -this sentiment existing (as man could not possibly have conceived to exist) independently of any succession of events. This idea - this sixth sense, upspringing from the ashes of the rest, was the first obvious and certain step of the intemporal soul upon the threshold of the temporal Eternity." (17)

By creating this new feeling of duration Poe explains the transcendence of the soul's life - the spirit which transcends human limitations and is placed closer to God. In "The Pit and the Pendulum" Poe is also led to the observation that consciousness can never be completely lost; not even in the grave. One can grasp here Poe's struggle to preserve spiritual integrity after physical death. He believed that the soul continued living a second and eternal life after death.

"The Conversation of Eiros and Charmion", as I have briefly asserted, is also a dialogue held in Aidenn. In both stories the lovers managed to reach eternal life and feel,

> "overburdened with the majesty of all things -- of the unknown now known - of the speculative Future merged in the august and certain Present." (18)

Another colloquy takes place in the world beyond in "The Power of Words". Through the conversation of Oinos and Agathos, Poe depicted the future life. They talk about the weakness of a spirit new-fledged with immortality. Oinos asserts that he thought in "Life Eternal" he would be cognizant of all things. Agathos replies that not even in Aidenn was knowledge intuitive and adds that happiness was not in knowledge but in the acquisition of it. Not even God (the Most High) knew all things; it was impossible to know everything because there was an infinity of matter. To quench the thirst of knowledge would be to extinguish the soul's self, which, he believed, never intellectually assented to knowledge. Poe also faced in this story the problem of creation. Agathos maintains that only in the beginning God created; that there are many things throughout the universe which are only indirect results of the Divine creative power. As a result of God's original impulse upon the air, ether pervades all space and is also a medium of creation. Poe seemed to agree with Galvani in that there was a kind of electricity in the air, which also created; that is, God's original impulse was endless because it propagated through every atom of the atmosphere. It was God's trascendent power. Poe goes on to say that, since every vibration once set in motion is eternal, the power of a word once spoken is also everlasting. I suppose that we cannot dismiss these scientific ideas as altogether fantastic, if we compare this story with the accomplishment of the radio waves. Electricity was therefore, the force which seemed to function in the universe as the most evident physical demonstration of "spirit" or the power of God.

As seen above, defining matter was a way for Poe to think about God. In "The Island of the Fay" he says that our telescopes and mathematical investigations assured us that space is an important consideration in the eyes of the Almighty. He discusses God's perfection in the cosmogony of the universe :

> "The cycles in which the stars move are those best adapted for the evolution, without collision, of the greatest possible number of bodies. The forms of those bodies are accurately such as, within a given surface, to include the greatest possible amount of matter; while the surfaces themselves are so disposed as to accommodate a denser population than could be accommodated on the same surface otherwise arranged. Nor is it any argument against bulk being an object with God, that space itself is infinite; for there may be an infinity of matter to fill it." (19)

In "The Island of the Fay" and "The Power of Words" Poe also refers to the creation of the animaculae when commenting on the creation and nature of the universe. With the observation regarding this microscopic organism he may be demonstrating his curiosity in relation to the most remote form of life. Perhaps more likely, he wanted to suggest a return to the prime source of being, back to the very beginning of things at the end of time. One apprehends here how far Poe's preoccupation with the destiny of the universe and his desire for absolute knowledge had led him. He was in quest of first principles and primal beings. He strived to transcend human limits and reach the knowledge of God and the absolute unity in the universe. An argument which reinforces the idea of transcendence is the fact that Poe appeared to play with time (past-present-future). "The Colloquy of Monos and Una", "The Conversation of Eiros and Charmion" and "The Power of Words" are held in the next world. In "Some Words with a Mummy" Poe deals with the ancient civilization. In "Mellonta Tauta" he satirizes the present from the vantage-point of the future. Playing with time may be interpreted as a way to transcend earthly limitations and be equal to God.

Most of the tales studied in this chapter were written between 1839-1845. It can then be ascertained by their analysis, that toward the

end of his life Poe was intensely preoccupied with complex problems such as metaphysics and transcendentalism. His philosophical inquiries on scientific matters were only a means to solve the mysteries of existence and the universe. In these later stories which deal with philosophical and speculative science, Poe's characters are most sincere : here his characters tend not to use science for hoaxing or showing off, but as a vehicle to something deeper. In "Mesmeric Revelation" and "The Facts in the Case of M. Valdemar", for example, the characters who use science are not interested in the mesmeric process as pure science but as a metaphor to the spiritual world. The experiments with mesmerism and galvanism (the latter in "Some Words with a Mummy" and "The Premature Burial") constitute for the scientists a medium to make the soul transcend matter. In all the speculative-scientific stories treated in this chapter, Poe's characters are in search of spiritual integrity. They are obssessed with the idea that if they can only discover the proper formula, the eternal life will be open to them. Science comes into play as a means to help in the solution of this formula. Another natural outcome of this obssession is the frequency with which his characters attempt to make contact with the supernatural world. The most powerful intellects of these stories entertain speculations on birth, death, and ressurrection. Also in "The Conversation of Eiros and Charmion", "The Colloquy of Monos and Una", "The Power of Words", and "The Island of the Fay", Poe's dramatic and philosophical view is this tension between existence and nothingness - the boundaries between life and death. But his characters can never know the mystery. At best they can suspect it. It is only in the vision of the unknown and the mysterious that Poe's characters come close to belief. They are not evil because of their attempts to go beyond the mysterious. Here his characters are idealists trying to create a better world. They are God-like men in search for infinite knowledge; it is in this aspect that Poe deviates from Hawthorne. Unlike his contemporary, Poe does not treat character as character. He is not interested in the characters' inner life. These scientists are cyphers who convey very broad cosmological speculations of his own. He meditated

about man's place in the scheme of the universe and tried to unriddle the mystery that his own exasperated ego told him he was able to solve. "Eureka", written one year before his death, is his last struggle to answer his inquiries. This work will not be analyzed in this study, but one can deduce from Quinn's comments on it, that in "Eureka" Poe thought he was becoming God. His exalted intelligence had allowed him, he believed, to penetrate the Universe. When he claimed "Eureka !" he meant that he had found out the secret of the universe. Levin also asserts that,

> "'Eureka !' is his heart-cry. ' I have found it !' he breathlessly seems to announce. 'The secret of the universe, the burden of the mystery ! Come sit down upon a cloud with me, and I shall explain it all to you. Do you know who created the world ? I did, just now.'" (20)

By believing himself able to unfold the secret of all things, Poe was trying to identify himself with the first spiritual unity or God. After he wrote "Eureka" he told his mother-in-law, Mrs. Clemm, that he had no desire to live any longer. He felt that he could not accomplish anything else. Perhaps Poe realized that he had gone too far, and found out that there are mysteries which can never be thoroughly revealed. Only death made him stop his life-long search for spiritual integrity. But his soul may still be soaring, looking for the answers he was not able to find during his earthly existence, for as he himself said, "the will may assent- the soul - the intellect, never." (21)

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(18) POE, ibid., p. 453.

(19) POE, ibid., p. 286.

(20) LEVIN, Harry. The Power of Blackness. Alfred A. Knopf, New York, 1970. p. 130.

(21) POE, opus. cit., p. 89.

7. Conclusion.

Poe's scientific tales may be read as products of his time, and as explorations of great hopes in the fields of physical and philosophical sciences. There is a contradiction though, for Poe revealed himself both a product of and at the same time an opponent of scientific industrialism. He attacked science but he also wrote scientific stories. Poe showed himself greatly interested in science but by no means treated it in a truly scientific way, as I have tried to prove.

There was a chronological shift in Poe's interests during his lifetime. He moved from interest in exact facts to more philosophical and abstract inquiries - a transition from pure science into philosophy and absolute knowledge. In the earlier part of his career, Poe wrote many tales in which he deals with exact or practical applied sciences; tales related to physics, chemistry, geography, astronomy, zoology, botany, and scientific inventions. He also treated pseudo-scientific subjects such as alchemy and phrenology. This certainly demonstrates his partly scientific mind. Although Poe uses scientific data to create an atmosphere of verisimilitude and gives the reader the illusion of a factual world, it seems to me, however, that he was not worried about pursuing profound studies into exact sciences. Poe was not scientific in the ordinary sense. In this phase of his fiction, his characters are either half-poet, half-scientist, or they use science for hoaxing or showing off. Poe's imagination created situations in which exact sciences describe emotional effects. He used exact sciences as a source of inspiration, to produce effects which were not at all exact. With this he evidently shows that his greater commitment is to what lies beyond exact facts. Toward the end of his career Poe's greatest preoccupation seemed to be with philosophical and speculative scientific matters. Here speculations on subjects such as magnetism, mesmerism and galvanism helped his characters transcend human limits in a search for immortality and infinite God-like knowledge. Behind everything was the thirst to solve the mysteries of the spirit, matter, time, space,

and the conception of the nature of the universe and of man. Poe's characters had an enormous Faust-like curiosity, a restless desire to penetrate the ultimate secret. In Poe this desire for absolute knowledge, which accounts for his interest in science, takes the form of a quasi-religious longing to enjoy an eternal life. The secret of this eternal life is what his characters are searching for in their esoteric knowledge. In all his scientific fiction Poe reminds us of the infinite world of the spirit, and science functions as a metaphor to reach that world - it helps the mind go over matter. Despite the fact that Poe's critics such as Levin have linked Poe with those conservative writers (Hawthorne and Melville) who reflect a tragic vision of human "blackness", the umpunished flights of his scientific characters link him with the radical self-improving thought of Emerson and the transcendentalist school.

In a sense, Poe's fiction was an attempt to work out a philosophy that would explain the soul's unification, upon death, with the larger spirit he was convinced existed behind the appearances of the universe. He apparently believed that there lay just beyond the comprehension of men, a world of spirit that dwarfed the world of everyday reality. This mystery, however is never defined to his scientific characters. We are never told exactly what the spiritual world is or what happens there. We may conclude that science constituted for Poe a medium to break down the barriers between the commonplace and transient, the mysterious and eternal. Poe strove to understand all phenomena, all experience, as parts of one large and mysterious unity. He aspired to enter into the mind of God.

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